UNIFIED FACILITIES CRITERIA (UFC)

DESIGN: ARTS AND CRAFTS AUTO HOBBY SHOPS

UNIFIED FACILITIES CRITERIA

ARTS AND CRAFTS
AUTO HOBBY SHOPS

HQ AIR FORCE SERVICES AGENCY (Preparing Activity)

Record of Changes (changes indicated **1**\ … /**1**/)

Change No.	Date	Location

This Unified Facility Criteria supersedes Air Force Pamphlets AFPAM 88-54 *Design Guide for Arts and Crafts Centers* and AFPAM 88-32 *Automotive Crafts Skills Development Centers* dated 31 March 1989.

FOREWORD

The Unified Facilities Criteria (UFC) system is prescribed by MIL-STD 3007 and provides planning, design, construction, sustainment, restoration, and modernization criteria, and applies to the Military Departments, the Defense Agencies, and the Department of Defense (DoD) Field Activities in accordance with USD(AT&L) Memorandum dated 29 May 2002. UFC will be used for all DoD projects and work for other customers where appropriate.

UFC are living documents and will be periodically reviewed, updated, and made available to users as part of the Services' responsibility for providing technical criteria for military construction. Headquarters, U.S. Army Corps of Engineers (HQUSACE), Naval Facilities Engineering Command (NAVFAC), and Air Force Civil Engineer Support Agency (AFCESA) are responsible for administration of the UFC system. Defense agencies should contact the preparing service for document interpretation and improvements. Technical content of UFC is the responsibility of the cognizant DoD working group. Recommended changes with supporting rationale should be sent to the respective service proponent office by the following electronic form: Criteria Change Request (CCR). The form is also accessible from the Internet site listed below.

UFC are effective upon issuance and are distributed only in electronic media from the Whole Building Design Guide website (http://dod.wbdg.org/).

Hard copies of UFC printed from electronic media should be checked against the current electronic version prior to use to ensure that they are current.

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CHAPTER 1

INTRODUCTION

1-1 PURPOSE

Unified Facilities Criteria (UFC) 4-740-21F, *Design: Arts and Crafts, Auto Hobby Shops* has been developed by the Air Force Services Agency (AFSVA) and provides guidelines for evaluating, planning, programming, and designing arts and crafts centers and auto hobby shops that support the Air Force's (AF) arts and crafts programs. AFSVA establishes and monitors the AF arts and crafts program policy. This document provides selected general information and unique specific criteria for the design of facilities that are aesthetically pleasing, economical, safe, efficient, and accessible to all users. Because each design must satisfy unique requirements and be compatible with the specific site conditions at each base, an individual solution for the particular needs of each installation is required. This guide is not to be viewed as the "last word" on design. Its contents are meant to aid the design process, not dictate it. A customized individual solution to the particular needs of each project is the primary objective of this UFC.

1-2 SCOPE AND USE

AFI 34-111, *Air Force Arts and Crafts Program* mandates that the arts and crafts program at each installation be managed as a single unit, including wood and industrial arts, multi-crafts, auto hobby shops, and custom services. Information provided by this UFC applies to the design of all arts and crafts center and auto hobby shop construction projects, including additions, alterations, and renovation projects in the continental United States (CONUS) and overseas (OCONUS). Alteration and renovation projects should update existing facilities to meet this guidance and criteria within budgetary constraints. This UFC also applies to the procurement of design/build services for the above noted projects. This document is not intended to provide all of the information needed to identify project requirements or successfully prepare project designs. It is also not intended as a substitution during design for thorough review by individual program managers and operations staff. This UFC is to be utilized in conjunction with Department of Defense (DoD) and Air Force (AF) specific documents, as required. Additional information on the unique program and design requirements of local projects must be obtained at the installation level.

This UFC provides guidance for the development of arts and crafts facilities appropriate to support local operations for arts and crafts programs at individual AF installations. This information may be used by architects/engineers (A/E), designers, base civil engineers (BCE), arts and crafts facility directors, Major Command (MAJCOM) and headquarters review personnel, and others involved in the development and approval of construction projects. It is intended to help all participants better understand AF skills facility requirements, programs, and design criteria so they can effectively participate in the project development process. Electronic versions of this UFC may be obtained from the HQ AFSVA and military UFC websites in a PDF (Portable Document File) format that may viewed on-line or downloaded for printing and off-line viewing.

1-3 DOCUMENT ORGANIZATION

This UFC is organized to provide the data and criteria needed at each stage of the project development process. Chapter 1 provides general introductory information regarding this document and describes the differences in facility classifications. Chapter 2 contains general facility planning criteria, such as understanding the customer's needs, site evaluation considerations, and environmental influences. Chapter 2 also provides specific programming guidelines and functional relationship diagrams for core component spaces needed for determining the unique requirements for each type of facility. Design guidelines for outdoor and indoor spaces for both types of facilities are addressed in Chapter 3. Chapter 4 provides specific information and functional area guidelines that includes example layouts for individual areas. Also listed are the furnishings or special equipment required in each space.

General information applicable to both types of facilities is addressed in the general section of each chapter. Facility specific information for arts and crafts centers is addressed separately from auto hobby shops in each chapter to detail the unique design considerations of each type of facility separately. A composite list of references is located in Appendix A. Detailed illustrative information, such as site and floor plans, are provided in Appendix B as examples of the guidance provided in this UFC. The appendix section also provides information regarding reference organizations and documents, a summary of figures and tables contained in the document, and a glossary of acronyms.

1-4 DISTRIBUTION OF RESPONSIBILITIES

The Major Command is responsible for management of design and construction of their Air Force facilities for the Military Construction (MILCON) program. The individual installation is responsible for design and construction of operation and maintenance (O&M) construction programs. Responsibility for design and construction of the Non-Appropriated Funds (NAF) construction programs may be at the MAJCOM or individual installation level. The Air Force Services Agency sets the standards for all Air Force arts and crafts programs and determines the facilities and equipment required to perform the operations.

1-5 MISSION STATEMENT

The mission statement for AFSVA's arts and crafts programs is to support AF "Mission Readiness" by providing technical, industrial, and fine art programs while developing vital life skills to enrich active duty personnel (all U.S. and host nation military), families, retirees, civilian employees, contractors, and other authorized users by providing for their quality of life. The program values are focused on safety, customer service, customer value, customer self expression, and personal development.

1-6 FACILITY CLASSIFICATIONS

AF arts and crafts programs provide a wide variety of staff, fee-for-service offerings, and self-directed activities. Due to the management of these programs, adjacencies and some potentially shared spaces are desired between the arts and crafts center and the auto hobby shop facilities at each installation. Since existing facilities and base conditions may not always support the desired relationships illustrated for prototypical

facilities, three separate types of facility classifications are identified and discussed in this UFC.

1-6.1 Collocated Facilities

Where possible, arts and crafts centers should be collocated with auto hobby shops on the same site, in adjacent sites, or at nearby locations. Facilities located on the same site may share some parking areas or other site amenities; however each facility has specific needs that may not always allow effective sharing of some elements. Collocated facilities may still require separate buildings, site entrances, and parking areas.

1-6.2 Separate and Remote Facilities

Existing conditions and facilities at each base may dictate the utilization of stand-alone facilities that are completely separated and remote from each other. These facilities may be located in completely different areas, due to the unique situations at each base. As a result, the guidelines provided in this UFC address facilities that must function independently of each other along with information regarding conjoined or collocated facilities.

1-6.3 Conjoined Facilities

Where possible, arts and crafts centers may be conjoined with auto hobby shops on the same site and may potentially have some shared building elements, such as lobbies or sales areas. Parking areas, vehicle entrances, and service drives may also be designed to serve both facilities and provide the most economical use of limited space or financial resources. Conjoined facilities may provide additional operational benefits by reducing staff and management requirements. Conjoined facilities must have separate and distinct entrances to any shared building structures and separate entrances to the site. Some general parking areas may be shared, but enclosed, secure parking areas will be required to support the unique requirements of auto hobby shops. This could be accomplished by locating the main vehicle entrance to each facility on different street frontage areas of the same site or complex.

1-7 OPERATIONAL IMPLICATIONS

Operational and procedural issues of the programs offered at each facility must be considered during the design process because they have a direct impact on the function of each facility. Selected programs and spaces for each facility may vary widely depending on the anticipated operating policies of each facility. Architects, engineers, designers, base civil engineers, and others involved in the development and approval of construction projects must have a thorough understanding of the anticipated installation specific programs and operational requirements. Procedures for installation level AF arts and crafts programs are provided in the following documents:

- AFI 34-111, *Air Force Arts and Crafts Program*
- AFMAN 34-134, *Air Force Arts and Crafts Program Operations* and IC 2005-01, *Summary of Revisions* dated 6 July 2005

CHAPTER 2

PLANNING AND PROGRAMMING

2-1 GENERAL PLANNING CONSIDERATIONS

The content of Chapter 2 provides guidelines and information needed for planning and programming conjoined, collocated, and separate and remote facilities, including the infrastructures needed to support them. Facility development planning and the programming of space requirements may be different for every project depending upon the unique factors regarding each installation. Local requirements concerning building programs, design criteria, and technical systems should consider the adequacy of existing facilities to meet current and future needs. The potential retention and renovation of existing facilities should also be analyzed compared to the need for new construction or additions to existing facilities. The development of both interior and exterior spaces shall satisfy the needs and policies of each facility, the needs and policies of the base, and comply with the overall size and budget limitations for the project. In addition, consider the following factors during the planning process:

- User Needs and Preferences - The type, number, and size of spaces appropriate for users and operators will vary depending on the climate, location, and demography of the base.
- Operating Policies - A predetermined plan of operation, based upon realistic assumptions about participation levels, merchandising potential, and scheduling, shall guide the choice of spaces. This plan shall identify all opportunities that exist for time and space sharing. Any similar arts or crafts activities or auto repair facilities available off base in the local community must also be considered during planning in order to avoid the expense of running redundant programs.

2-1.1 Program Definition

The facility classification will affect the required program spaces and sizes. Entire function areas or spaces may be eliminated if their functions occur in other programmed areas. This is especially true for arts and crafts centers since many different programs may be provided within shared general arts and crafts spaces. Reduce size requirements for spaces that are partially duplicated or shared elsewhere in the facility. Affected program areas may include support areas, classrooms, and other areas that may service multiple programs if schedules permit. The Requirements Document defines the program for design of an individual project, including functional requirements, design criteria, and cost information. This includes the space programming guidance found in this chapter, plus the site design, building design, and facility systems concepts located in Chapter 3, *General Design Guidelines*. In addition, any unique, local requirements concerning building programs, design criteria, and technical systems should be included in the Requirements Document. Chapter 2 should be used to prepare the DD form 1391, *Military Construction Project Data*. This

includes functional spaces, the architectural space distribution program, overall building size, site evaluations, plus special cost factors.

2-1.2 Project Validation Assessment

The Project Validation Assessment (PVA) of all core functional areas and installation specific amenities to be included must satisfy the particular customer needs and policies of the base, and comply with the overall size and budget limitations for the project. The specific type, number, and size of spaces appropriate for users will vary depending on the climate, location, and demography of the base. For example, installations with a high proportion of dependents on the base may require a more extensive arts and crafts program than an installation primarily composed of active duty personnel. Consider the anticipated installation specific programs and the space requirements needed to accommodate each of them. It is important to work with the Army and Air Force Exchange Service (AAFES) during the PVA to ensure that services are not duplicated.

2-1.3 Standardizing Core Programs

Areas that are essential for operating a full spectrum of arts and crafts programs that support the AF readiness mission for CONUS and OCONUS installations have been identified in this UFC to help ensure equal service between installations. The five core program groups include:

- Instructional
- Do-It-Yourself
- Sales
- Customer Service for Fee
- Special Events

In addition, information regarding installation specific component spaces and programs has also been included that may need to be included in the planning of new facilities if the customer needs assessment identifies these supplemental spaces and programs are needed.

2-1.4 Facility Requirements

Consider the standardized core programs, installation specific programs, and the operating policies at each facility during overall building planning and functional relationships required when developing the space program for an individual facility. The space allocation sizes provided in this UFC are not definitive space programs, but guides to approximate space sizes recommended for the given size facility. Actual space requirements are based on local conditions and identified requirements of the community served. Consider the possibility for consolidation of some facility components when developing combined facilities. Each base may also determine that different or additional requirements are relevant to its local program. These considerations may affect the functional areas and spaces included in the program and their relative sizes. Space allowances found in AFH 32-1084, *Facility Requirements*, dated 1 September 1996 will be updated at its next revision to reflect the new space allocation information provided in this UFC for each type of facility.

2-1.5 Supervision and Observation

A strict system of observation and control is crucial for arts and crafts centers and auto hobby shops. The key to efficient facility design is a clear understanding of the surveillance requirements needed to minimize liabilities and staff requirements.

2-1.6 Accessibility

As a matter of law, new construction, additions, and renovations of existing facilities must be designed and constructed in compliance with the Architectural Barriers Act (ABA), which requires that people with disabilities have access to facilities designed, built, or altered with Federal money or leased by Federal agencies. DoD has not yet issued implementing guidance for the new Architectural Barriers Act Accessibility Guidelines published by the U.S. Access Board on July 23, 2004. Nonetheless, the best practice is to comply with these guidelines, which are posted on the Board's web site at http://www.access-board.gov/.

Until DoD implements the new ABA guidelines, please be aware that the Secretary of Defense has established a policy that DoD facilities will comply with the accessibility requirements established under the Americans with Disabilities Act (ADA), instead of the ABA requirements, whenever a particular ADA requirement is more stringent than the corresponding ABA requirement. This requires analysis of the Uniform Federal Accessibility Standards (UFAS) issued in 1984 and the Americans with Disabilities Act Accessibility Guidelines as amended through 2002, both of which are also posted on the Board's web site.

All functional areas shall be barrier-free and accessible to people with disabilities. Site and building designs should enable people with disabilities to act independently and enjoy the full range of programs provided. Level changes may be included but must be accommodated by ramps suitable for wheelchair access, both indoors and outdoors. Include access to all areas and facilities, including staff and work areas, restrooms, water fountains, and pay telephones.

2-1.7 Building Codes

All AF arts and crafts centers and auto hobby shops must be designed, constructed, and altered in accordance with DoD criteria and local codes. These criteria are based on national standards, private sector consensus standards, and model codes. Refer to UFC 1-200-01, *Design: General Building Requirements* and UFC 3-420-01, *Plumbing* for specific guidance. In the event of conflicts between model codes and DoD criteria, use DoD requirements. For situations outside the continental United States (OCONUS) where there is a conflict between mandatory code requirements, the national building code would take precedence.

2-1.8 Antiterrorism/Force Protection (AT/FP)

DoD objectives for AT/FP are to reduce personnel exposure to security threats and limit property damage. The DoD policy and guidance for antiterrorism and the physical security of facilities is contained in UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings* and UFC 4-010-02, *Design (FOUO) DoD Minimum Standoff Distances for Buildings*. These requirements are applicable for new construction, restoration, and modernization of existing facilities. Due to the functional requirements of Arts and Crafts Centers and Auto Hobby Shops, some ATFP requirements, such as

require standoff distances, may be difficult or impossible to accommodate given the nature of these facilities. Alternative AT/FP measures may need to be considered based upon the information provided by these UFC and other DoD directives. Additional AT/FP guidance may also be obtained from the following sources:

- AFI 10-245, *Air Force Antiterrorism (AT) Standards*
- AFI 31-101, *The Air Force Installation Security Program* (FOUO)
- AFI 31-203, *Security Forces Management Information System (SFMIS)*
- *USAF Installation Force Protection Design Guide*
- DoD Directive (DoDD) 2000.12, *DoD Antiterrorism/Force Protection (AT/FP) Program*
- DoD Instruction (DoDI) 2000.14, *DoD Combating Terrorism Program Procedures*
- *EUCOM Operations Order 03-11 with FRAGO* (07 Jul 04)
- UFC 4-021-01, *Design and O&M: Mass Notification Systems*

2-1.9 Sustainable Development

It is AF policy to apply sustainable development concepts in the planning, design, construction, environmental management, operation, maintenance, and disposal of facilities and infrastructure projects that are consistent with budget and mission requirements. This policy was established in a memorandum from HQ USAF/ILE, dated December 19, 2001. Each Major Command should incorporate sustainable development using Leadership in Energy and Environmental Design (LEED™) criteria as defined by the United States Green Building Council (USGBC). The *Air Force Sustainable Facilities Guide* provides tools, suggested guidelines for selecting candidate projects, and complete AF sustainable development policies. The goal is to have all MILCON/NAF projects in the fiscal year 2009 (FY09) program capable of achieving LEED™ certification. Submission to the USGBC for actual LEED™ certification is at MAJCOM discretion. This policy does not apply to host nation or NATO funded projects.

Use an integrated approach to the planning and design of arts and crafts facilities that minimizes energy consumption and optimizes life cycle costs. A practical combination of site selection and siting, energy conserving building envelope technologies, energy efficient lighting, occupant sensing controls, variable frequency drives for motors and exhaust fans, and high efficiency heating, ventilating, and air conditioning (HVAC) systems should be used to achieve this goal. Incorporate renewable energy principles, such as day lighting, passive and active solar heating, natural ventilation, and photo-voltaics, where they are life cycle cost effective. Sustainable development concepts will benefit the Air Force by creating high performance facilities with long term value. They should be integrated into the development process and balanced with all other design criteria to achieve the best value for the Air Force. The economic analysis process

need not change, but the elements to consider will now include sustainable technologies and their potential for long term savings.

2-1.10 Solar Applications

Passive solar applications shall be considered during design that include building shape, building orientation, zoning of interior space for heating and lighting needs, sky lighting, and protected entrances. Window locations, window treatments, shading devices, and insulation shall be considered for all windows to control heat gain or loss. Except for bases in Alaska and Greenland, virtually all Air Force bases have the potential for significant savings of energy costs for building heating and electric lighting by using passive solar applications, primarily solar day lighting techniques. Unique passive solar applications that are not part of normal design shall be employed only where they are proven to be cost effective and will provide at least 25 percent of the required space heating or cooling, or 35 percent of the lighting required for the facility. Active solar applications shall be provided only where they are proven to be cost effective by the base or MAJCOM through solar assessment techniques discussed in current Air Force directives. They must also provide a minimum of 25 percent of the required space heating or cooling and 35 percent of the domestic water heating on a yearly basis. Design building HVAC systems for energy efficiency, including consideration of passive and active solar systems, where appropriate. Consider a proper sized active solar heating system and/or domestic hot water heating system if the MAJCOM's solar assessment shows a benefit to cost ratio of greater than one.

2-1.11 Department of Defense (DoD) Energy Budget

Design of new facilities must ensure that building energy consumption does not exceed the DoD energy budget figures. The building energy consumption shall not exceed the DoD energy budget amounts based on 50 operating hours weekly, with hot water as a process load. The utilization of sustainable development policies will help achieve energy efficient facilities.

2-1.12 Environmental Issues

Arts and crafts facilities have specific environmental considerations, such as the disposal of waste oil, chemicals, and other toxic items. The disposal of all waste materials and storm water shall be in compliance with local codes and Environmental Protection Agency (EPA) requirements. Safe provisions shall be incorporated for the storage and handling of hazardous materials, and spill prevention precautions shall be provided. An AF Form 813, *Request for Environmental Impact Analysis*, must be completed and submitted to the Civil Engineer Squadron Environmental Flight at each installation after the submission of AF Form 332. Refer to AFCESA Engineering Technical Letters, local codes, and base environmental policies regarding storm and waste water disposal. Additional environmental information and up-to date information regarding integrated "whole building" design techniques and technologies also be obtained from the *Whole Building Design Guide* which further explains the environmental issues related to building materials and provides technical guidance on green building material selection.

2-1.12.1 EPA Guidelines

When specifying products that are included in the Environmental Protection Agency's (EPA) list of affirmative procurement guideline items, A/Es must include the requirements for these products to meet or exceed the recycled material content standards established by the EPA. The list of products and their corresponding recycled content requirements are found at the following URL www.epa.gov/cpg/products. Listed products likely to be used include building insulation, furniture and cushions, cement and concrete, latex paint, floor tiles, restroom dividers, and structural fiberboard.

2-1.13 Cost Estimating

Cost estimating procedures must follow the guidance given at the Air Force Center for Environmental Excellence (AFCEE) and Air Force Civil Engineer Support Agency (AFCESA) websites. The following special factors should be accounted for when establishing initial estimates of project costs in addition to the usual cost estimating considerations. See relevant sections of Chapter 3 and Chapter 4 for a discussion of specific design requirements for each factor.

- Provide preliminary soils analysis to determine whether high site work and foundation costs will be required. Local wind, snow, permafrost, seismic activity, tornados, hurricanes, floods, and other weather conditions must be considered for their impact on project costs.
- Consider the costs for meeting seismic requirements.
- Conceal conduit and fiber optic LAN wiring, yet provide easy access for continuous upgrading.

2-1.14 Site Selection

Site selection issues will vary depending on the facility classification (conjoined, collocated, or separate and remote) required. Facilities in all three classifications should be located near the center of base activities near facilities such as the Fitness Center, Health and Wellness Center (HAWC), Community Center, and the Youth Center, where possible. The existing base general plan, existing conditions, or existing buildings to be repurposed at each base may dictate separate and remote facilities. It is desired that these facilities be conveniently located near dormitories, housing, and shopping areas so that they are near the hub of community activity. Uncongested areas are preferred, but avoid locations near busy intersections, arterials, airfields, and industrial facilities. Evaluate the potential impact of natural site features, such as terrain, existing trees and vegetation, wetlands, and water retention areas, on the proposed facility design. Existing natural site features may be incorporated into required site elements, like AT/FP setback distances or vehicle barriers that may help to blend the facility into the natural setting of the site. Potential sites should be selected to minimize or eliminate problems in design and construction costs. If an available existing structure cannot be reasonably or economically adapted to meet the needs of the required facility, a suitable site must be chosen for new construction. One or more sites may be designated on the base general plan and appropriate for the required activities. When alternative sites are available, the following criteria shall guide selection.

2-1.15 Site Size

The site shall be large enough to accommodate all the components of the facility, including those expected to be added in the future. These components include parking, pedestrian access, building size, and outdoor facilities. In addition, the size of the site shall allow for open or landscaped spaces around these components for drives and walks, safe separation between activities, grading transitions between components, and required setbacks from adjacent property. More area may be needed if the site has any special features, such as irregular contours, existing trees, or rock outcroppings to be preserved. Assure the selected site will accommodate an adequate number of parking spaces convenient to each facility entrance and the AT/FP setback requirements provided in UFC 4-010-10, *DoD Minimum Antiterrorism Standoff Distances for Buildings*. A preliminary site design should be prepared to ensure the basic building and site criteria can be accommodated. Site size should provide for future expansion, if practical.

2-1.16 Site Considerations

Positive drainage shall be provided to eliminate ponding on grassy areas and on paved surfaces, such as the parking lot, long term vehicle storage, entry area, terraces, patios, and courtyards. Avoid sites adjacent to restricted or hazardous areas. Do not select sites where excess traffic generated by use of the center will congest housing, community centers, or other base activities. Locate buildings to provide the most convenient access, to take advantage of desirable views and natural site features, and to provide protection from undesirable winds and glare. Areas of frequent airplane traffic should be avoided. Provide natural or constructed shading for exterior functional areas for protection from excessive sunlight. Locate the customer entrance in front of the facility near the street or near to a vehicular drop-off loop with convenient sidewalk access to the entrance. Potential sites should meet the following criteria:

- The site should be approached by sidewalks and should not require pedestrians to cross heavily traveled areas.
- The necessary utilities, water, sewerage, and electricity are readily available.
- The topography is level enough for construction and the soil is stable, but free of rock that is costly to excavate.
- The site is not close to heavy industrial smoke or other unpleasant or harmful pollutants.
- The site is near the hub of base community activities.
- The site should have good natural drainage.
- All site drainage must be directed to oil and water separators.

2-1.17 Site Access

Provide easy access by pedestrians, automobiles, and base public transportation traffic. Bus access is encouraged. Address accessibility issues for people with disabilities in accordance with ADA and ABA requirements. Choose a site with a prominent, visible location. The facility should be easily identifiable from approaching cars, base transportation, and pedestrian pathways. Consider a dedicated service drive near the

back of the facility for easy access to dumpsters, recycled materials, maintenance vehicles, and hazardous material storage containers waiting for disposal.

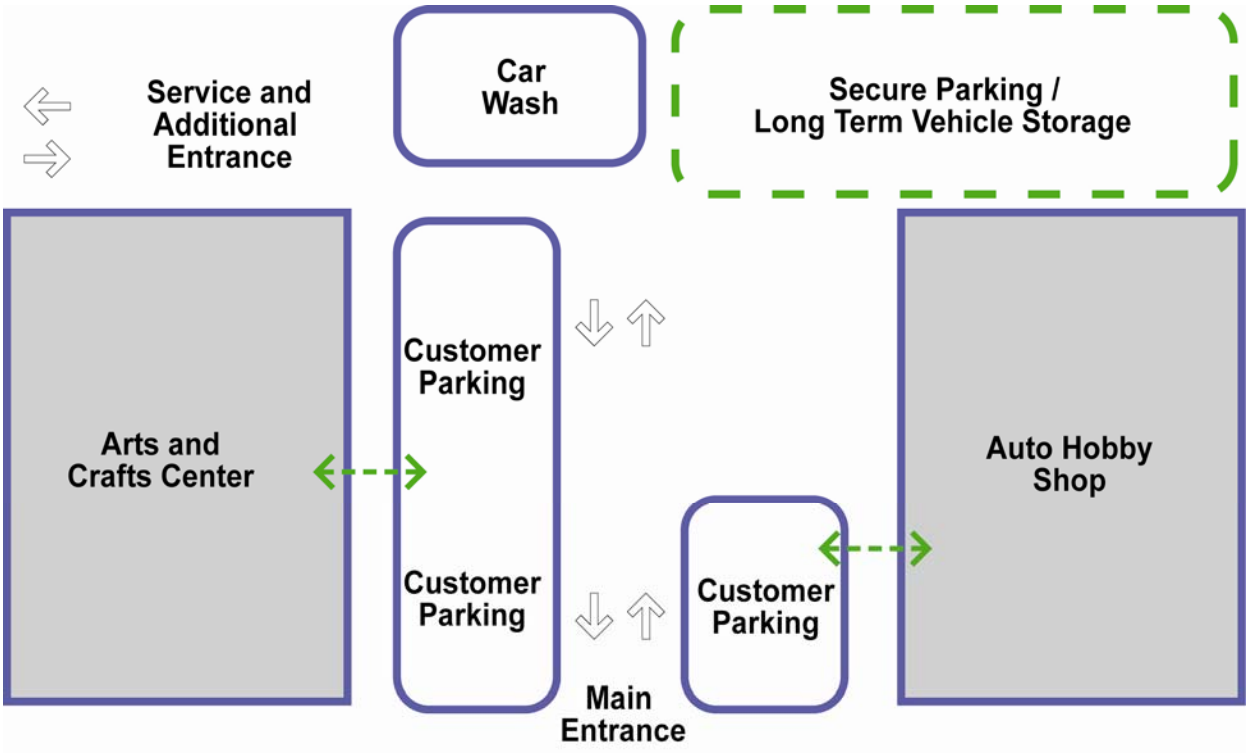
2-1.18 Site Utility Requirements

Potential sites should be evaluated to determine the availability of utility services and conformation of easement and property lines. Potential sites shall by readily served by the required utilities, but shall not infringe on right-of-ways that might limit its use. Facilities shall be located near access to major utilities, including water, sewage, electricity, telephone, and gas lines. Storm or sanitary sewer systems capable of handling large volume water discharge are needed as required by local codes. Provide water service, natural gas, steam service or fuel oil system (whichever is used), electricity, telephone, security, and fire alarm service to the building in accordance with requirements in AFH 32-1084, *Facility Requirements*, UFC 1-200-01, *Design: General Building Requirements,* and local service procedures. Include connections to the base computer network and communication systems.

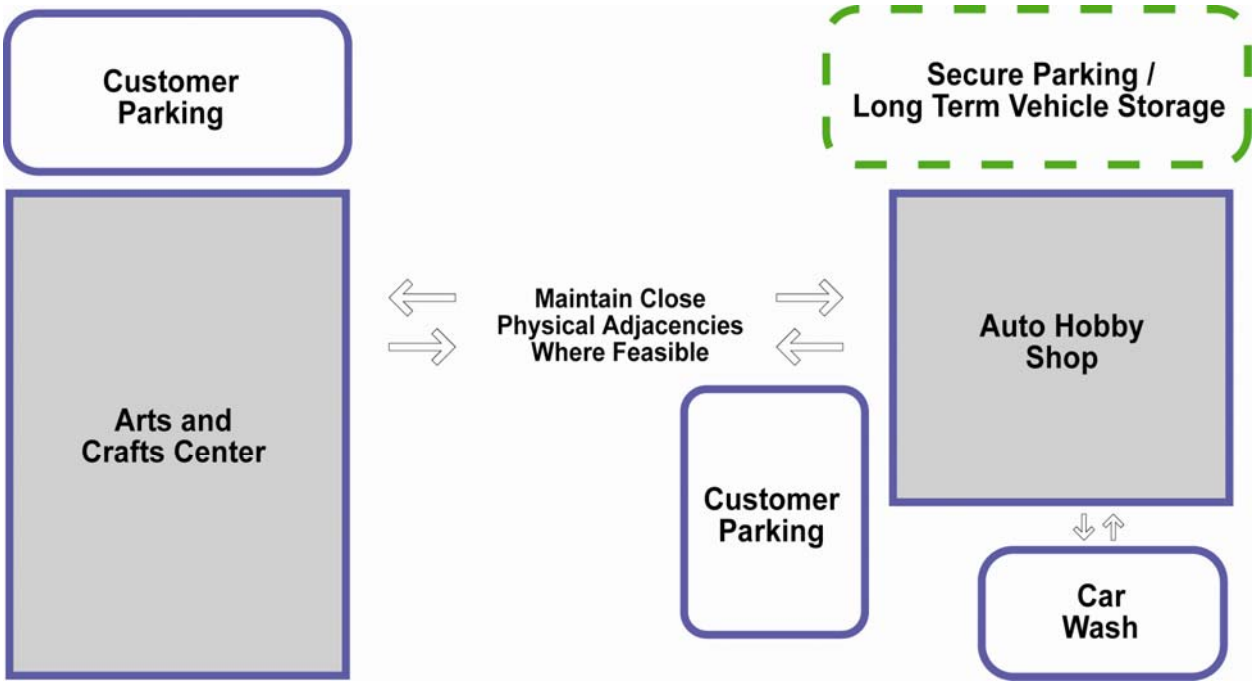
2-1.19 Site Functional Relationships

The following diagrams illustrate the basic functional relationships desired for all three facility classifications:

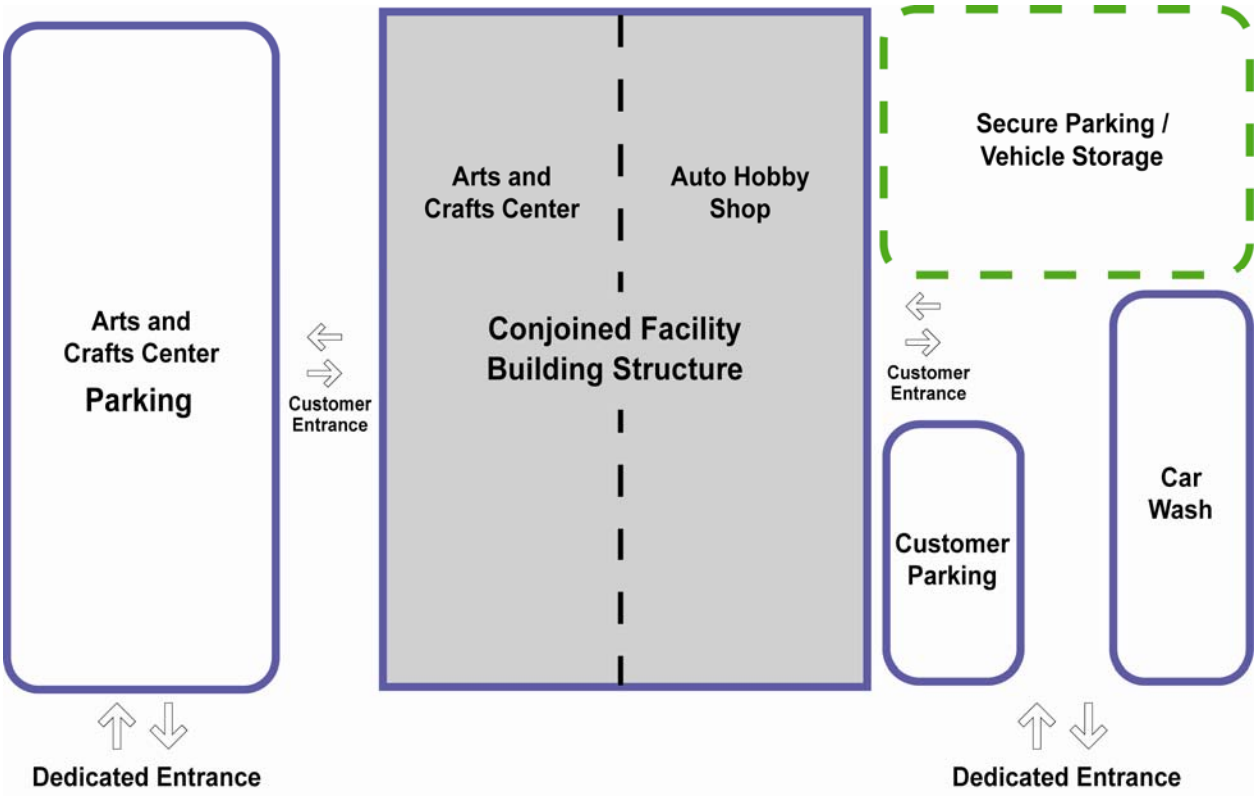
2-1.19.1 Figure: Collocated Facilities Site Functional Relationships



2-1.19.2 **Figure: Separate and Remote Site Functional Relationships**



2-1.19.3 **Figure: Conjoined Site Functional Relationships**



2-1.20 Topography and Sub-Soil Conditions

Proposed sites shall be able to accommodate both the building and parking areas without recourse to either extensive grading or restructuring of existing drainage runoff systems. The soil shall be able to support the facility without resorting to extensive foundations, rock excavation, or soil compaction. The existing topography of potential sites should be evaluated to determine the impact of existing conditions on potential construction. Geotechnical investigations should be conducted to identify sub-soil conditions, the elevation of the water table, and the bearing capacity of the soil. The A/E should make recommendations regarding the locations of soil borings. Evaluation of the soil report should be a primary consideration of potential sites. Geotechnical data should be evaluated by the structural engineer to determine the most cost effective foundation system. Consider the impact of existing subsurface rock on the position of buildings, parking areas, and other structures so that excavation can be minimized and consider the possible recycling of excavated rock for alternative uses.

2-1.21 Facility Size

The initial overall size planned for arts and crafts facilities is provided in AFH 32-1084. The project scope is validated through the Project Validation Assessment (PVA) process, based upon the projected usage and economic analysis.

2-2 ARTS AND CRAFTS CENTER PROGRAMMING

Arts and crafts include instructional programs directed toward the recreational, vocational, and educational needs of authorized users to provide sufficient knowledge to pursue constructive and creative hobbies and increase competence in fine arts, crafts, and industrial arts. The development of a facility space program for an arts and crafts center should result in a facility that supports the AF mission to promote the specific morale, welfare, and recreation (MWR) arts and crafts programs and operational activities described in AFI 34-111 and AFMAN 34-134. Refer to document IC 2005-01 dated 6 July 2005 for a summary of revisions to AFMAN 34-134. These facilities should enhance the leisure time of adults by making available to them the instruction, materials, equipment, and space they need to undertake creative and constructive activities. Participants benefit from the knowledge, skills, and sense of achievement that develops as they pursue and complete projects involving fabrication, exhibition, and/or repair.

2-2.1 Core Component Spaces

The size of individual facilities must support the core requirements of arts and crafts centers at a minimum. Minimum core component spaces that should be provided regardless of the facility size include the following:

- General Arts and Crafts Studio
- Framing Studio
- Woodworking Studio
- Computer Studio
- Graphics Studio
- Support Spaces

2-2.1.1 Installation Specific Component Spaces

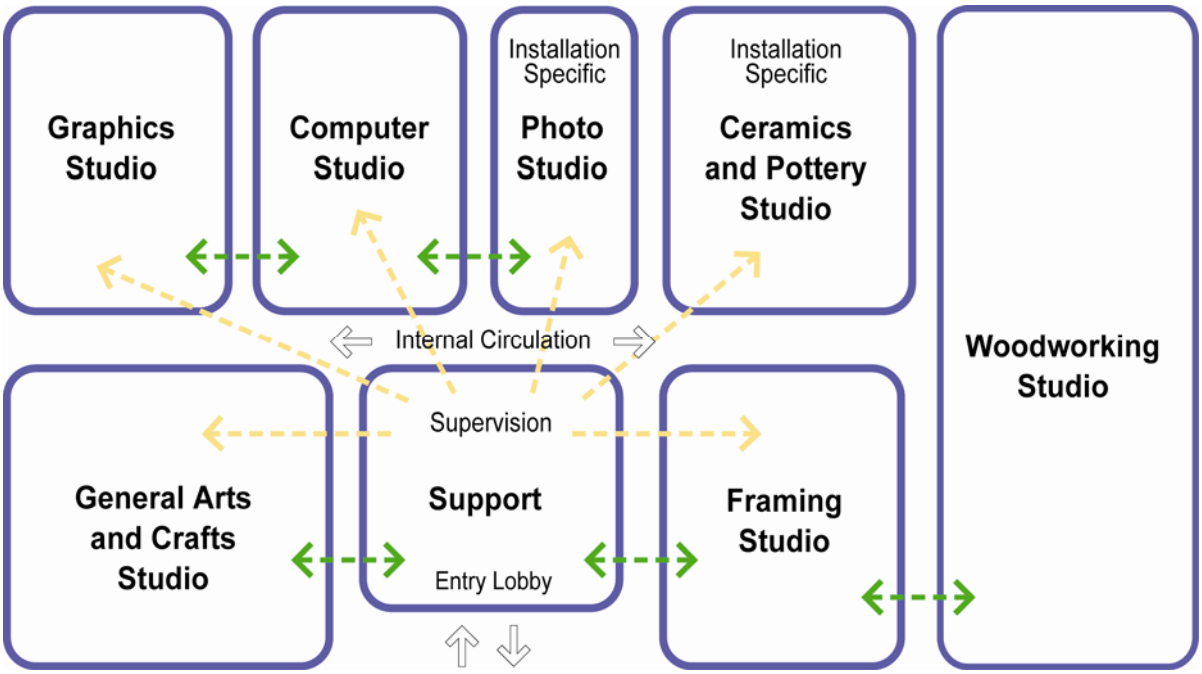
Installation specific component spaces and programs may include:

- Ceramics and Pottery
- Photography Studio and Photo Lab

2-2.2 Core Area Functional Relationships

To maximize the efficient operation of the facility, the spaces shall be arranged to result in the proximities illustrated. These spatial affinities derive directly from the desired zoning of component spaces in a prototypical facility. Specific project requirements may require alternative relationships. Figure 2-2.2.1 describes the generally preferred functional relationships of spaces within the arts and crafts center.

2-2.2.1 **Figure: Core Area Functional Relationships**



2-2.2.2 **Table: Access Controls**

	User Access	Visual Monitoring	Exterior Access
General Arts & Crafts	S, P, V	2	Yes
Woodworking Studio	S, P, V	1	Yes
Woodworking - Tool Issue	S	1	No
Framing Studio	S, P, V	1	No
Computer Studio	S, P, V	1, 2	No
Graphics Studio	S, P, V	1	No
Support - Office	S	1	No
Support - Classroom	S, P, V	2	No
Support - Lobby & Gallery	S, P, V	1, 2	No
Support - Sales Store	S, P, V	1, 2	No
Support - Restrooms	S, P, V	2	No
Support - Library/Lounge	S, P, V	2	No
Ceramics & Pottery Studio	S, P, V	2	Yes
Photography Studio	S, P	2	No

S = Staff Only
P = Participant
V = Visitor

1 = Of Activity Itself
2 = Of Entrance to Activity

2-2.3 Space Allocation

The recommended set of functional areas and spaces for prototypical arts and crafts centers are shown in Table 2-2.3.1 *Arts and Crafts Center Space Allowances*. This table provides example space sizes for each component of representative facilities in each arts and crafts facility program size category. These are not definitive space programs, but guides to approximate space sizes recommended for the given size facility. Installation specific criteria may need to be considered for some areas. In developing the space program for an individual facility, consider the issues of overall facility design and the functional relationships discussed in this UFC. Detailed space allocation information may be obtained by utilizing the space calculation tool provided on the design guides section of the AFSVA website.

2-2.3.1 Table: Arts and Crafts Center Space Allowances

	Combine	Space Per Unit		Planning Factor	Minimum Quantities and Areas (must be justified if quantity not shown)			
		Sq. Meters	Sq. Feet		Quantity	Units	Sq. Meters	Sq. Feet
General Arts & Crafts Studio 5 Total Areas								
Multi-Purpose Rooms/Alcoves		4.65	50	Per Person	10	Persons	46.25	500
Fabric and Needle Crafts		4.65	50	Per Person	5	Persons	23.23	250
3D Design		4.65	50	Per Person	5	Persons	23.23	250
2D Design		4.65	50	Per Person	5	Persons	23.23	250
Jewelry and Metal Arts		4.65	50	Per Person	5	Persons	23.23	250
Storage		4.65	50	Per Person	1	Persons	9.29	100
Woodworking Studio								
Shop Equipment					4	Each		
Table Saw		20.07	216	Per Power Tool	1	Each	20.07	216
Radial Saw		13.38	144	Per Power Tool	1	Each	13.38	144
Planer		22.30	240	Per Power Tool	1	Each	22.30	240
Joiner		16.72	180	Per Power Tool	1	Each	16.72	180
Belt/Disc Sander		9.29	100	Per Power Tool				
Band Saw		18.39	198	Per Power Tool				
Drill Press		6.69	72	Per Power Tool				
Jig Saw		2.79	30	Per Power Tool				
Wood Lathe		4.18	45	Per Power Tool				
Shaper		5.57	60	Per Power Tool				
Disc Sander		5.85	63	Per Power Tool				
Work Tables		5.02	54	Per Power Tool				
Shop Equipment Circulation		5.57	60	Per Power Tool (average)				
Raw Material Storage		93	10	Per User (Users=50% of Tools)	3	Persons	2.79	30
Project Storage		.93	10	Per User (Users=50% of Tools)	3	Persons	2.79	30
Tool Issue Storage/Service Desk		7.43	80	Per Power Tool	1	Persons	7.43	80
Framing Studio								
Resale Display		3.72	40	Per Work Table	1	Table	3.72	40
Framing Areas		17.84	192	Per Work Table	1	People	17.84	192
Raw Material/Framing Storage		6.97	75	Per Work Table	1	People	6.97	75

Combine = if Collocated or Conjoined Facilities

(Table 2-2.3.1 continued on next page)

	Combine	Space Per Unit		Planning Factor	Minimum Quantities and Areas (must be justified if quantity not shown)			
		Sq. Meters	Sq. Feet		Quantity	Units	Sq. Meters	Sq. Feet
Computer Studio								
Computer Stations		3.72	40	Per Station	2	Sq. Area	7.43	80
Printers		3.72	40	1 Printer Per 4 Stations	1	Sq. Area	3.72	40
Copiers		3.72	40	Per Copier	1	Sq. Area	3.72	40
CD, DVD, VHS Reproduction		3.72	40	Per Station	1	Each	3.72	40
Computer Repair		7.43	80	Per Station	1	Each	7.43	80
Multi-Media Classroom		4.65	50	Per Station	1	Each	4.65	50
Graphics Studio								
Awards, Recognition, and Graphics		18.58	200	Per Area (2 Persons)	1	Each	7.43	80
Engraving		3.72	100	Per Area (1 Persons)		Each	3.72	40
Printing		18.58	200	Per Area (2 Persons)	1	Each	3.72	40
Trophies		18.58	200	Per Area (1 Persons)		Each	3.72	40
Silk-Screen		18.58	200	Per Area (2 Persons)	1	Each	7.43	80
Storage		4.65	50	1 Per Area		Each	4.65	50
Support Spaces								
Sales Shop				10% of All Arts & Crafts Areas		Sq. Area	13.94	150
Lobby/Gallery		20.07	3	Per Occupant Capacity		Sq. Area	13.94	150
Multi-Purpose Classroom	Combine		25	Per Student		Persons		
Manger's Office	Combine	11.61	125	Per Office	1	Persons	11.61	125
Administrative Offices/Workstations	Combine	7.63	80	Per Workstation	1	Persons	7.63	80
Restrooms	Combine	4.65	50	Per 15 Occupants		Sq. Area	37.19	400
Library/Lounge		2.32	25	Installation Specific Per Area	1	Persons	2.32	25
Staff Break Area	Combine	2.32	25	Per Staff		Sq. Area		
Vending Area	Combine	4.65	50	Per Machine	1	Each	4.65	50
Ceramics Studio								
Slip Casting		4.65	50	Per Person	1	Persons	4.65	50
Pottery		4.65	50	Per Person	2	Persons	9.29	100
Kilns		5.95	64	Per Kiln	2	Each	14.96	161
Storage		9.29	100	Per Person	5	Persons	18.58	200
Photography Studio								
Lab/Dark Room		18.58	200	Per Lab	1	Each	18.58	200
Studio		37.16	400	Per Work Station	1	Each	37.16	400
Storage				10% of Photography Studio				
Building Support								
Janitor	Combine	4.65	50	One Minimum Required	1	Sq. Area	4.65	50
Mechanical	Combine			Installation Specific (5% est.)				
Electrical	Combine			Installation Specific (5% est.)				
Communications	Combine			Installation Specific (5% est.)				
Circulation and Structure				Installation Specific (estimate 30% of net area)				
Outdoor Spaces								
Crafts Work Area		18.58	200	Installation Specific	2	Sq. Area		
Project Loading Area (Woodworking)		37.16	400	Installation Specific	1	Each		
Vehicle Parking (Customers & Staff)		37.16	400	25% of Customer Capacity		Spaces		

Combine = if Collocated or Conjoined Facilities

2-2.4 Facility Size

The initial overall size of the arts and crafts center shall be established using AFH 32-1084. The base population of active duty military personnel plus a percentage of dependents and retirees will also help to determine the allowable size. The final project scope is validated through the Project Validation Assessment (PVA) process, based upon the projected usage and economic analysis. Recommend identifying activity/facility functional aspects and specific requirements of particular areas, and deleting specific information relating to overall scope. The planned size may also be influenced by considerations such as whether the proposed facility represents new construction or conversion of an existing structure, whether special activity needs are evident, and whether suitable facilities offering similar programs are present in the surrounding community. The maximum allowable sizes for arts and crafts centers are listed in Table 2-2.3.1. This table indicates the minimum area needed for each of the many component spaces, both required and optional, in a facility. It also shows how the size of the overall facility affects the size of each component space.

The square footage needed to house mechanical equipment is not included in these numbers since it varies according to climate. Net floor area shall therefore be calculated as total squared meters (feet) other than that devoted to walls, structure, corridors and toilets. The gallery/lobby space, though serving the circulation function, fulfills other needs and hence shall be tallied as net usable square meters (feet).

2-2.5 Special Considerations for Renovation

The following conditions shall be satisfied if an existing building is to be considered for adaptation for use as an arts and crafts center:

- Location and Accessibility - The building's site shall be convenient to the base community and only adjacent to facilities that are functionally compatible. Utilities required by the project shall be available on site.
- Size - The existing building's floor area shall be equivalent to the square footage planned for the project. If not, the structure shall be capable of expansion by means of a simply configured addition.
- Layout - Building floor plans shall permit the compact circulation scheme and distinct environment zones required for an arts and crafts center. The structure's form and volume shall allow for the higher ceilings and obstructed floor areas required in the studios and woodshop.
- Condition - The building shall be structurally sound and economical to renovate, operate, and maintain.
- Image - The building shall be adaptable, without extensive alterations, to an architectural character appropriate for an arts and crafts center. This may include enlarging or highlighting the main entrance, adding landscape with suitably placed signage, and providing outdoor lighting and work spaces.

2-2.6 Self Directed Requirements

Support for customers' arts and crafts pursuits is an important factor consideration for an arts and crafts center and information needs to be provided to help keep them enthused. Include ample areas for displays, bulletins, magazines, books, catalogs, videos, and newsletters devoted to customer interests. Include space for resources regarding external suppliers, programs, services, or equipment that may not be provided by the center.

2-2.7 Instructional Requirements

Classroom instruction and exhibitions are a primary component of a successful year-round program. Consult the arts and crafts center director regarding the need for classrooms and the use of multi-purpose rooms for instructional activities and demonstrations. Include areas to publicize course offerings, schedules, contests, and other promotional materials to disseminate information to customers. Class supplies should be available at the Arts and Crafts Sales Store as a convenience for customers and adequate product shelf and display space is required for inventory. Storage areas are also needed for surplus inventory and slow moving items.

2-3 AUTO HOBBY SHOP PROGRAMMING

Auto hobby shops may be conjoined, collocated with, or separate and remote from the arts and crafts centers. Due to the management implications involved, these relationships will affect the required program spaces and sizes. Eliminate entire function areas or spaces if their functions occur in other programmed areas of the arts and crafts center. Reduce size requirements for spaces that are partially duplicated or shared elsewhere in the facility. The affected program areas will probably include support, classrooms, etc. Auto hobby shops offer facilities for instructional, self-help, and fee-for-service maintenance and repair of privately owned vehicles (POVs), motorcycles, motor scooters, trailers, marine engines, water crafts, and other items requiring a large enclosed area where workable space for large pieces of machinery is needed. Equipment and tools are needed to complete normal automotive repair and services. Facilities for automotive body shop activities, such as removing dents, straightening parts, sandblasting, sanding, painting, and other reconditioning for vehicles are also required. Enclosed areas are needed for doing body work, rust proofing, and painting. The development of a facility space program for an auto hobby shop should result in a facility that supports the AF mission to promote the specific Services auto hobby programs and operational activities described in AFI 34-111 and AFMAN 34-134. Refer to document IC 2005-01 dated 6 July 2005 for a *Summary of Revisions* to AFMAN 34-134.

Auto hobby shop facilities should enhance the leisure time of adults by making available to them the instruction, materials, equipment, and space they need to undertake creative and constructive activities. Participants benefit from the knowledge, skills, and sense of achievement that develops as they pursue and complete projects involving fabrication, maintenance, and/or repair. Development of the facility space program should take into consideration the existing auto repair facilities near the base and their adequacies and inadequacies relative to current and future needs.

2-3.1 Core Component Spaces

The size of individual facilities must support the core requirements of auto hobby shops at a minimum. Minimum core component spaces include the following that should be provided regardless of the facility size:

- Dedicated Stalls
  - Front End Alignment
  - Lubrication
  - Tire Mounting and Wheel Balancing
  - Muffler and Exhaust
- General Repair
  - Engine Repair Stalls
  - Tune-up Stalls
- Stall Support Spaces
  - Battery Charging
  - Engine and Parts Storage
  - Vehicle Storage

- Parts Washers
- Shop Areas
  - Machine Shop
  - Welding and Tank Storage
- General Support Spaces
  - Service Desk, Tool Issue, and Sales
  - Customer Waiting Area
  - Vending Area
  - Classroom
  - Sales Inventory Storage
- Administration
  - Manager's Office
  - Staff Break Room
- Car Wash
  - Vacuum Stations

2-3.1.1 Installation Specific Component Spaces

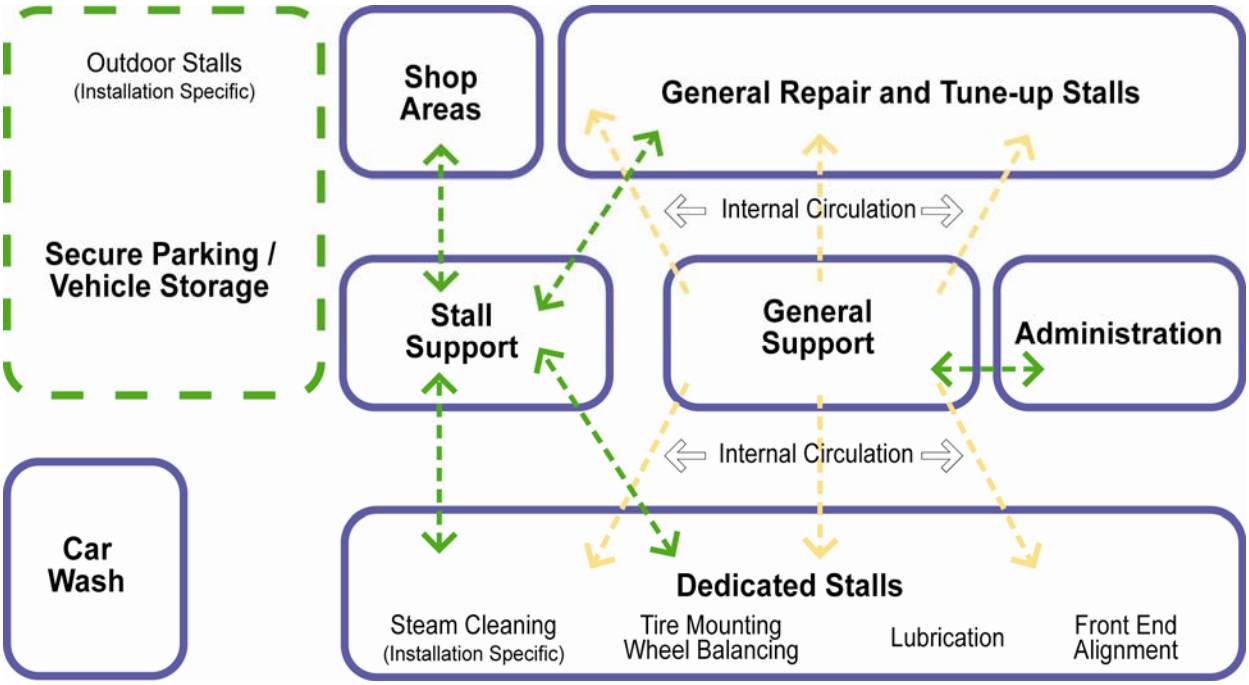
Installation specific enhanced amenities may include some of the following:

- Outdoor General Repair and Tune-up Stalls
- Paint Booth and Body Repair
- Steam Cleaning and Wash Racks
- Large Vehicle Repair Stalls
- Sandblasting

2-3.2 Core Area Functional Relationships

To maximize the efficient operation of the facility, component spaces shall be arranged to result in the proximities illustrated in Table 2-3.2.1 that shows the generally preferred functional relationships of spaces within an auto hobby shop. These spatial affinities derive directly from the desired zoning of component spaces in a prototypical facility. Specific project requirements may require alternative relationships. In developing the space program, consider the issues of overall building design and relationships discussed in Chapter 3. Each base may also determine that different requirements are necessary for its local program. The considerations may affect the functional areas and spaces included in the program and their relative sizes.

2-3.2.1 **Figure: Core Area Functional Relationships**



2-3.3 **Space Allocation**

The recommended set of functional areas and spaces for different size auto hobby shops are shown in Table 2-3.3.1 *Auto Hobby Shop Space Allowances*. This table provides example space sizes for each component of representative facilities in each auto repair facility program size category. These are not definitive space programs, but guides to approximate space sizes recommended for the given size facility. For facility sizes not included in this table, proportionally adjust the program figures shown for the nearest larger or smaller sized facilities. In developing the space program for an individual facility, consider the issues of overall facility design and the functional relationships discussed in this UFC.

These are not definitive space programs but guides to approximate space sizes recommended for the given size facility. Modify the set of spaces and sizes as appropriate to fit individual project needs within the criteria established in this UFC. For facility sizes not included in this table, proportionately adjust the program figures shown for the nearest larger or smaller size facilities. A general space allowance goal of 46.45 square meters (500 square feet) per automobile stall is typical. Exercise discretion when applying this space allocation to meet the needs of a particular installation. For instance, compute an outdoor covered work area as one-half the square footage of a similar sized space fully enclosed. Regions with climates that permit extensive use of outdoor covered work areas can take advantage of this factor. Conversely, in cold climates it is not practical to adopt a design that contains many overhead vehicle doors. However, the use of a design which employs a limited number of vehicle entrances similar to large commercial garages requires more space for internal maneuvering. Perform an economic analysis to balance the costs for additional space against the reduced operation costs, and the possible savings in perimeter walls.

2-3.3.1 Table: Auto Hobby Shop Space Allowances

	Combine	Space Per Unit		Planning Factor	Minimum Quantities and Areas (must be justified if quantity not shown)			
		Sq. Meters	Sq. Feet		Quantity	Units	Sq. Meters	Sq. Feet
Dedicated Stalls								
Front End Alignment		40.13	432	# of Stall Installation Specific	1	Bay	40.13	432
Lubrication		40.13	432	# of Stall Installation Specific	1	Bay	40.13	432
Muffler and Tire		40.13	432	# of Stall Installation Specific	1	Bay	40.13	432
General Repair and Tune-up Stalls								
Repair and Tune-up		40.13	432	# of Stall Installation Specific	1	Bay	40.13	432
General Stalls		40.13	432	# of Stall Installation Specific	1	Bay	40.13	432
Stall Support Spaces								
Stall Support		8.92	96	Square Feet per Bay		Sq. Area	44.59	480
Battery Charging		5.95	64	Per Area	1	Sq. Area	5.95	64
Engine and Parts Storage		3.25	35	Per Shop Area	1	Each	3.25	35
Shop Areas								
Machine Shop		18.58	200	Per Shop Area	1	Each	18.58	200
Welding and Tank Storage		18.58	200	Per Shop Area	1	Each	18.58	200
General Support Areas								
Service Desk and Tool Issue		5.57	60	Per 4 Stalls	1	Sq. Area	5.57	60
Customer Waiting Area		2.32	25	Per 25% of FFS Stalls	1	Sq. Area	2.32	25
Resale Inventory Storage		7.43	80	25% of Service Desk	1	Sq. Area	1.39	15
Vending Area	Combine	4.65	50	Per Machine	1	Each	4.65	50
Classroom	Combine	2.32	25	1 Student Per Bay	0	Sq. Area		
Restrooms	Combine	4.65	50	Per 15 Occupants	1	Sq. Area	4.65	50
Research Computers		3.72	40	Per Computer Station	2	Sq. Area	7.43	80
Administration Areas								
Manager's Office		11.61	125	Per Office	1	Sq. Area	11.61	125
Office Workstations		7.43	80	Per Workstation	1	Sq. Area	7.43	80
Staff Break Area	Combine	2.32	25	Per Staff	1	Sq. Area	2.32	25
Support				Installation Specific	1	Sq. Area		
Installation Specific Enhanced Amenities								
Paint Booth and Body Repair		40.13	432	Installation Specific		Bay		
Steam Cleaning		46.82	504	Installation Specific		Bay		
Large Vehicle Repair Stalls		46.82	504	Installation Specific		Bay		
Wash Racks (indoor)		40.13	432	Installation Specific		Bay		
Sand Blasting		46.82	504	Installation Specific		Bay		
Building Support								
Janitor	Combine	4.65	50	One Minimum Required	1	Sq. Area	4.65	50
Mechanical	Combine			Installation Specific (5% est.)		Sq. Area		
Electrical	Combine			Installation Specific (5% est.)		Sq. Area		
Communications	Combine			Installation Specific (5% est.)		Sq. Area		
Circulation and Structure				Installation Specific (estimate 30% of net area)		Sq. Area		

Combine = if Collocated or Conjoined Facilities

(Table 2-3.3.1 continued on next page)

	Combine	Space Per Unit		Planning Factor	Minimum Quantities and Areas (must be justified if quantity not shown)			
		Sq. Meters	Sq. Feet		Quantity	Units	Sq. Meters	Sq. Feet
Outdoor Spaces								
Repair and Tune-up Stalls				Installation Specific		Bay		
Covered Repair and Tune-up Stalls				Installation Specific		Bay		
Car Wash				Installation Specific		Bay		
Car Wash Vacuum				Installation Specific		Bay		
Vehicle Parking (Customers & Staff)		37.16	400	50% of Indoor Bays		Space		
Secure Vehicle Storage		37.16	400	Installation Specific		Space		
Driveways				Installation Specific		Sq. Area		

Combine = if Collocated or Conjoined Facilities

2-3.4 Special Considerations for Renovation

All building and functional area design criteria and recommended relationships apply to renovation projects. When retrofitting an existing building, select a suitable permanent structure. The structural system should be open and relatively column free. Column spacing must accommodate standard stall dimensions. If needed, transform the image of the existing structure, inside and outside, to reinforce its identification as an automotive hobby shop. Because of the unique facility requirements for auto hobby shops, opportunities to renovate or repurpose existing facilities are limited. Most opportunities to repurpose existing buildings will consist of old government owned vehicles (GOV) motor pool repair facilities. The potential for retention and renovation of existing facilities, need for additions, or complete new construction projects will be determined by the current and projected user population to be served by the proposed new facility.

CHAPTER 3

GENERAL DESIGN GUIDELINES

3-1 GENERAL

Chapter 3 provides general design and material guidance, including detailed requirements for the site, parking areas, buildings, infrastructure, and other unique issues regarding arts and crafts centers and auto hobby shops that are addressed separately. General professional knowledge with which A/Es are familiar is not addressed. These guidelines address design considerations for site and building layout, architectural character, function, circulation, and facility systems. Information is provided regarding the preferred materials and finishes that deliver the required durability, yet are still functional and aesthetically pleasing. Functional diagrams and other guidance regarding potential facility layout configurations have been provided to illustrate how the core functional areas could potentially be organized.

Facility systems information is also provided regarding structural considerations, HVAC systems, plumbing, electrical, fire protection, life safety, communications, audio/visual systems, alarm/security systems, and acoustical requirements. Special considerations regarding operational requirements, installation specific programs, and the renovation of existing facilities are also addressed to help facilitate the preparation of design specifications and contract documents which meet or exceed the *AFSVA Golden Eagle Standards*.

3-1.1 Design Development

Once the list of spaces to be included in an arts and crafts facility has been established and the unique needs to each space understood, the overall organization of the buildings and their site(s) can be addressed. In addition to complying with the general criteria, proposed designs shall provide a compatible solution for the specific project requirements. An individual design is required for specific sites that enhance the surrounding built and natural character of each base. Other than meeting the aforementioned design objectives and space criteria, factors affecting the success of a given design include:

- ***Value and Cost:*** The design must result in a complete facility that can be constructed within the project funds and be maintained economically. The project scope is validated through the Project Validation Assessment (PVA) process, based upon the projected usage.
- ***Operating Efficiency:*** The individual spaces shall be thoughtfully arranged to meet the specific needs of the user population and allow for maximum efficiency of staff utilization. Designs shall maximize the advantages and minimize the disadvantages of the environmental conditions of the base.
- ***Project Cost:*** The design shall be guided by considerations that reduce project costs. Options shall be considered that may result in savings in the total construction and operating costs where they are permitted by

other project requirements and consistent with the PVA. Structural, architectural, and mechanical costs can be reduced with a compact building volume and careful placement of mechanical and filter rooms to reduce the length of "runs."

- ***Floor Area:*** The gross area of the facility can be less than the authorized size. If possible, reduce the floor area below the allowable limit by using a compact plan that can minimize floor areas for corridors, walls, and structure. Some areas may also be reduced by using multi-purpose spaces that will efficiently allow two or more activities at the same time or by sharing time instead of single spaces that are each limited to one activity.
- ***Building Massing:*** Structural, building enclosure, and mechanical costs can be reduced with a compact building volume. Simple roof configurations that result in high ceilings over the studios, lobby space, wood shop, molding storage areas and auto repair stalls with standard clearances elsewhere contribute the most to a cost effective volume.
- ***Simplified Construction:*** Use familiar building assemblies and terms that do not require a specially qualified labor force or special construction equipment for installation. Include durable, water resistant materials that have a low life cycle cost, minimize the number of different materials used, and select materials that are locally available. Utilize systems that can be supplied and maintained economically.
- ***Energy Management:*** Operating costs can be reduced by applying the principles of passive solar design. The effective use of insulation shall be optimized using a life cycle cost study. Fuels that can be provided economically and reliably for the life of the facility shall be selected. An HVAC system with economizing cycles and facility-wide monitoring capacity is required.

3-1.2 General Design Process

Design drawings and data are submitted in a series of stages, typically including concepts, early and regular preliminaries, and final working drawings. Based on the space program defined in Chapter 2, general guidance for the design phase is addressed as part of this chapter. Chapter 4 provides detailed design guidance regarding each functional area. Concept designs should conform to the design considerations provided in this chapter. Preliminary and working drawings should address this information, plus the specific space criteria, technical issues, and functional area requirements provided in Chapter 4. The illustrative designs in Appendix B help explain the programming and design guidance of the preceding chapters through example application to prototypical site plans and building floor plans.

3-1.3 General Parking Requirements

Refer to AFH 32-1084 for detailed information regarding the parking space requirements. Provide accessible parking spaces for people with disabilities according to the requirements identified in Section 2-1.6, *Accessibility*. Provide dedicated parking spaces for motorcycles, battery operated vehicles, customers and staff, as required.

Include bicycle parking racks located near the main entrance in a secure location that does not conflict with vehicular traffic.

3-1.4 Building Access

Provide clearly identified pedestrian and barrier-free access for people with disabilities to the main entrance according to the accessibility requirements identified in Section 2-1.6, *Accessibility*. Reinforce connections to related base facilities with clear, direct pathways. Provide separate vehicular access for a main entrance drop-off area and for the service entrance. Provide a minimum separation between facility entrances and the street curb according to current AT/FP requirements provided in Section 2.1-8, *Antiterrorism/Force Protection*.

3-1.5 Architectural Character

An arts and crafts center shall have a distinctive external form that expresses the vital, base-wide role it plays in the adult community. It shall create a sense of place, announce its presence, and invite use. Although there is no single mandatory style, building designs shall respect the style, scale, and character of the surrounding area. Climate site conditions, cultural heritage, or regional architecture may also appropriately influence its appearance. Careful consideration should be given to coordinating material selections, course lines, roof slopes, scale of windows, and other building elements to ensure the building style complies with the base specific architectural compatibility guidelines and better buildings in the local area. Use local materials to reflect regional architectural character and any particular site and climate conditions. Use harmonious materials, careful detailing, proper screening of unsightly areas, and appropriate color selections to develop an aesthetic quality. Consider local construction practices and choose materials on the basis of availability, climate, durability, ease of maintenance, economy, and capability to generate visual interest through color, texture, and scale.

Maintain Architectural Compatibility with Base Standards

Maintain Architectural Compatibility with Base Standards

The architectural and interior design of arts and crafts center facilities must be integral and related. Both involve functional analysis and consideration of the appropriate environmental character, building organization, circulation, supervision, and flexibility requirements, as well as finishes and furnishings. Present an open, inviting image, while providing visibility of attractive activities from the customer entrance. Controlled, indirect daylight should be admitted into studios, woodshops, and auto repair stall areas

through clerestories, skylights, or windows. Use of daylight will reduce the load on electric lights and permit visual connection to the outside. Consider sunlight filtering devices applied to windows and solar shade screens to reduce UV exposure and reduce thermal heat gain. Locate unsightly elements, such as HVAC equipment, sawdust collection bins, dumpsters, and hazardous material (HAZMAT) storage bins at the back of the facility where they are not visible from roads and parking areas. Screen these items and similar elements, when needed, with landscaping, walls, fencing, and other architecturally compatible materials.

3-1.6 Landscaping

The siting of the overall facilities, layout of the interior spaces, and positioning of patios and terraces shall take advantage of natural growth and desirable views. Utilize landscape elements to define outdoor work areas, direct traffic flow, muffle noise, screen objectionable views, control the sun and wind, and conserve energy. Tree roots, overhanging branches, and creeping vines may give rise to maintenance problems and hence shall be avoided. Landscape plantings may be used to create or define outdoor work areas, control external circulation, shade walls, windows, and roofs to reduce energy consumption, screen objectionable views, improve the appearance of the building, highlight the main entrance, control sun and wind, and/or discourage vandalism. Plant materials shall be appropriate to the climate and terrain and require minimal maintenance. Utilize indigenous plants and trees that are appropriate for the climate and the local base conditions.

Landscape plantings can dramatically improve the first impression of a facility and can also help control erosion. Landscaping may also be utilized to create stand off distances required for effective AT/FP measures and to create buffer zones around the facility. In some instances, landscaping may also reduce maintenance requirements. Follow sustainable design principles for xeriscaping and low water usage plant design. Never use poisonous or toxic plants. Preserve and use natural site features, such as topography, foliage, and rock outcroppings. Landscaping must be maintenance free and vandal-proof. Avoid the use of plantings that are either so minimal or protected that the functional and aesthetic purposes are defeated. Landscaping must not create obstructions of views, for either drivers of vehicles or pedestrians, or other safety hazards. Refer to the *USAF Landscape Design Guide* for additional information regarding landscaping.

3-1.7 Site Signage

An exterior signage system should be developed in accordance with UFC 3-120-01, *Air Force Sign Standard*. Exterior sign programs should be coordinated with the exterior design of the building and local base standards. Facility identification signs may be freestanding signs located near the main vehicular entrance to the facility or signage attached to the building as required by base standards. Include AFSVA identification and branding signs, where appropriate, according to the guidelines provided in the current *Services Signage Enhancement Program*. For conjoined facilities, a shared identification sign may be used if the main entrance to the complex serves both facilities. Individual signs for each facility will be needed if each facility has its own dedicated entrance to the site. For collocated facilities, separate signs will be required to identify each facility and to provide the separate operation information for each. Site

signs should also identify the dedicated parking areas, service areas, accessible entrances, and other facilities for the disabled. Provide information regarding the facility's hours of operation and force protection condition (FPCON) on exterior signage located near the main entrance.

3-1.8 Site Lighting

General artificial illumination of the parking lot shall be one foot candle as measured at pavement level. The loading dock and public entrances shall have auxiliary flood lighting to raise levels to 20-foot candles as measured at the ground plane. Provide exterior lighting for outdoor repair stalls, patios, terraces, parking areas, and walkways utilizing high intensity discharge light sources. Ensure that parking areas and the facility have adequate lighting for safety, evacuation, and security measures. Provide supplementary incandescent, low brightness exterior lighting for walkways and other areas, as needed.

3-1.9 Facility Systems

Facility systems include specific guidelines for core building systems, such as structural, mechanical, electrical, plumbing, lighting, fire protection, life safety, and acoustics. General facility systems information and resource documents are provided in this section. Specific technical requirements regarding each type of facility and functional area are addressed in sections two and three of Chapter 3, and in Chapter 4. Identify all piping according to the American Society of Mechanical Engineers (ASME) A13.1, *Scheme for the Identification of Piping Systems.*

3-1.10 Structural

Select an economical structural system based on facility size, projected load requirements, local availability of materials and labor, wind, snow, seismic, geologic, and permafrost conditions. All structural systems must comply with applicable DoD and other government criteria. Select and design the structural system based on analysis of projected future needs to accommodate future expansion requirements easily and economically. However, do not over-design the initial construction. Structural bay sizes should reflect space requirements, economy, and subsystem dimensions, such as masonry units and ceiling grids. Keep the floors to under two stories in height, where possible, or the costs associated with designing progressive collapse criteria will need to be incorporated. The exact soil conditions, sub-soil conditions and water table depth should be verified during the geotechnical investigation at the beginning of the design process. For detailed structural design requirements, refer to UFC 1-200-01 *Design: General Building Requirements*, UFC 3-310-01 *Design: Structural Load Data,* International Building Codes, and other related UFC located on DoD websites.

3-1.11 Heating, Ventilation, and Air Conditioning

Provide heating, ventilating, and air conditioning (HVAC) systems in compliance with UFC 3-410-01FA, *Design: Heating, Ventilating, and Air Conditioning* and UFC 3-410-02A, *Design: Heating, Ventilating, and Air Conditioning (HVAC) Control Systems*. Also comply with the recommendations of the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), where applicable. Detailed procedures for HVAC control and design are also found in AFH 32-1084, *Facility Requirements*. Provide for hook-ups to the base Energy Mamagement Control System (EMCS), if

applicable. Auto hobby shops do not require air conditioning due to the open nature of these facilities, however heating and special ventilation requirements are addressed in Section 3-3.

Provide a night setback for the HVAC system and zone control for maintaining different environmental conditions in each functional area. Provide tamper-proof thermostats that are programmable and located where they may be internally controlled by facility managers. Utilize security features so that thermostats are only accessible to authorized personnel. Design of new facilities shall ensure that building energy consumption shall not exceed the DoD energy budget figures. Perform a life cycle cost analysis of available energy sources and design the HVAC system to comply with the requirements of the most current edition of the International Mechanical Code (IMC). Utilize *MIL-HDBK 1003/3, Heating, Ventilating, Air Conditioning, and Dehumidifying Systems* as supplemental guidance until it is replaced. Provide mechanical exhausts for each restroom.

Comply with AT/FP requirements in the design of HVAC systems. Incorporate energy efficiency as a primary design consideration, including consideration of passive solar design applications. Consider optimum sized active solar space heating and domestic hot water heating systems if the MAJCOM's solar assessment shows a benefit/cost ratio of greater than one. Consider climate conditions, high humidity, industrial atmosphere, salt water exposure, or other adverse conditions when selecting exterior HVAC components to ensure durability. All mechanical systems should be installed to control air quality (humidity, temperature, dust and fume levels, etc.). These systems shall be high quality, industrial-rated, fully reliable equipment, ductwork, and filters included. The maintenance headaches and health hazards that invariably arise from inferior under-sized systems negate the savings realized from the purchase of low-initial-cost equipment. Refer to AFCESA Engineering Technical Letters for additional information. Label all pipes and ducts to identify their purpose and the directional flow of contents. Design building HVAC systems to accommodate long term flexibility, renovations, and additions.

3-1.12 Mechanical Rooms

Provide dedicated rooms to house mechanical and electrical equipment that work in conjunction with smaller utility closets located throughout the building, as needed. The size requirements of these rooms will vary with the amount of mechanical equipment needing to be housed. Direct access shall be provided from an exterior service entrance. Mechanical rooms shall be located to minimize the lengths of distribution services. To the greatest extent possible, all circulation associated with the mechanical services and maintenance operations shall be separate from public circulation. Mechanical rooms will be required to accommodate HVAC equipment, plumbing, electrical, hot water, telephone, fire suppression, and other building systems equipment. This room shall serve as the primary location for the mechanical and electrical equipment for the facility. Label all pipes, wires, fuse breakers, and ducts to identify their purpose and the directional flow of contents. Locate mechanical rooms so that they have entry and service doors located on the outside of the building only, to minimize noise and service disruptions.

Provide sound proofing, where required. Utilize a sloped floor towards a floor drain for rooms with equipment involving water or that may leak. All circulation associated with mechanical services and maintenance operations shall be separate from circulation provided for the public. Service doors shall be treated architecturally in a manner that will minimize their visibility or impact on the building design. Utilize sealed concrete floors to resist stains. Enclosing walls shall be sealed or painted masonry to resist stains. Should the type of mechanical equipment installed in this room require fire resistant construction, the ceiling structure shall be protected by painted gypsum board. Otherwise, the structure shall remain exposed. Shop-type fluorescent fixtures delivering a minimum of 15-foot candles at floor level shall be installed depending on local base practices concerning access to mechanical rooms. If possible, mechanical room entrances should not be located at the front of the facility but to the side or rear. This is to minimize the impact these areas have on the aesthetic appearance of the facility.

3-1.13 Plumbing

Provide domestic hot and cold water, sanitary and storm drainage, plus propane or natural gas systems (if required) in accordance with design requirements established in UFC 3-420-01, *Plumbing* and AFH 32-1084, *Facility Requirements*, *International Building Code* (IBC), local requirements, and additional technical information provided on the AFCESA website. Provide metering for gas service, if utilized. Provide frost-free hose bibs on exterior walls to enable hose access to the entire site and locate interior hose bibs at each repair stall in the auto hobby shop. Shut-off valves shall be provided at all plumbing fixtures. Consider providing water metering where water conservation measures are in effect.

Provide hot and cold water for toilet rooms, service sinks, janitor's closets, multi-purpose rooms, frame shops, graphics, and ceramics. Hot water temperature shall not exceed 40 degrees C (105 degrees F) at the outlet. Consider the need for an instantaneous, tankless electric water heater for on-demand hot water to sinks in studios and administrative areas to eliminate the need to continually store and heat water 24 hours a day. All sinks shall be chemical resistant and of commercial or industrial quality. Sinks located in ceramic or pottery studios require sediment traps to prevent clogs. Provide chilled water drinking fountains. Floor drains shall be located in the restrooms, janitor's closets, dirty room, and ceramics studio.

3-1.14 Restrooms

Provide separate, accessible toilets according to the accessibility requirements identified in Section 2-1.6, *Accessibility* for both men and women. Utilize flushometer style commercial toilets that are more durable and require less maintenance than tank-top residential models. Each toilet room shall include a lavatory, mirror, soap dispenser, paper towel dispenser or blower, handrails, baby changing station, air fresheners and deodorizing systems, and a separate exhaust fan. Provide at least one low mounted urinal near the men's toilets for children and people with disabilities in accordance with ADA and ABA requirements. Locate restrooms near the lobbies and support areas. The peak number of customers and staff anticipated will establish the size and quantity of toilets. Provide an equal number of toilets for men and women unless local circumstances dictate otherwise. Utilize graffiti-proof and corrosion resistant toilet stall partitions that are still attractive and compliment the interior design of each restroom.

Consider utilizing recycled plastic toilet and urinal stall partitions because they are non-corrosive, cost effective, durable, and environmentally friendly. Provide air fresheners and deodorizing systems for toilets and urinals. Provide a separate exhaust system for each restroom.

3-1.15 Custodial Closets

Provide custodial closets in each facility for storage of janitorial equipment and supplies with other maintenance items for the restroom and overall facility. Include a floor mounted mop sink, dry storage for supplies, shelves for maintenance supplies, and a sloped floor with a floor drain. All surfaces must have water resistant finishes. The recommended minimum size is 1.21 x 1.83 meters (4 x 6 feet). Provide shelves and hooks for cleaning and maintenance equipment and supplies. Include adequate lighting and ventilation to prevent excessive moisture and mildew.

3-1.16 Electrical

Provide electrical service and distribution equipment, wiring receptacles and grounding, interior and exterior lighting and controls, emergency lighting, telephones, communication systems, fire alarms, and intrusion systems in accordance with UFC 3-520-01, *Interior Electrical Systems,* NFPA 70, *National Electrical Code,* and the latest installation design requirements. See the latest edition of *Electric Current Abroad,* provided by the U.S. Department of Commerce, to determine voltages and cycles for overseas locations. Service grounding systems and all wiring methods must meet the current National Electric Code (NEC) requirements and NFPA 70 requirements. Provide ground fault protection of all motors, lighting fixtures, and power receptacles at suitable levels. All electrical equipment must be Underwriters Laboratories (UL) listed or published proof of safety and performance from an approved independent testing laboratory shall be provided. Label all electrical panels, circuit breakers, and other related equipment. Provide a sufficient number of floor and wall electrical outlets to accommodate current needs and potential future growth. All electrical outlets shall feature ground fault circuit interrupter (GFCI) protection. Secondary underground service raceways may be PVC Schedule 40. Base service ampere capacity upon the following minimum criteria for the building:

- General Interior Lighting - 2.5 watts per square foot
- Receptacles - 1.0 watts per square foot
- Exterior Area Lighting - 10 watts per square foot

Interior lighting for new construction shall meet the current codes and recommendations of the Illuminating Engineering Society of North America (IESNA). Renovation of existing interior lighting shall meet the current recommendations of the IESNA to the extent possible. Additional guidance for lighting renovation in federal buildings may be found on the Federal Energy Management Program (FEMP) website. Provide battery operated or otherwise contingency powered emergency lighting systems and illuminated exit signs in accordance with NFPA standards. Consider the need for a communications room that is separate from the electrical room. Communications equipment requirements and base standards usually require a separate communications room.

3-1.17 Alarm Systems

Provide an alarm system for intrusion detection to protect equipment and assets. Coordinate at the base level to provide alarm system equipment that is compatible with the systems utilized at each base. Provisions for an alarm system must be justified during the planning and programming process. Refer to the publications provided on the AFCESA website for additional technical information.

3-1.18 Fire Protection and Life Safety

Sprinklers and fire alarms are required, particularly in the lumber storage area. Glues, varnishes, chemicals, gas, and other flammable or hazardous materials shall be stored in fireproof cabinets with the appropriate class of fire extinguisher mounted directly adjacent. Fire protection and life safety designs must comply with the following sources for detailed guidelines and specifications:

- UFC 3-600-01, *Design: Fire Protection Engineering for Facilities*
- UFC 3-600-02, *Operations and Maintenance Inspection, Testing, and Maintenance of Fire Protection Systems*
- MIL HNBK 1008C, *Fire Protection for Facilities, Engineering, Design and Construction*
- Latest edition of the National Fire Protection Association (NFPA) standards

All new and refurbished buildings shall have automatic fire detection and/or fire suppression systems, which shall be monitored to send signals to the base fire station and/or central control or monitoring facilities. All materials and equipment shall be UL listed or Fire Marshall approved. The provisioning of fire protection systems and equipment shall be reviewed for all new and refurbished buildings as part of a “Fire Risk Analysis” and “Fire Strategy” study, executed during the design period. During the design period, careful consideration shall be given to the selection of specific design codes, standards, base specific criteria, and Base Fire Marshall Requirements that affect the equipment specifications, design, and installation. Equipment selections should not be considered in isolation but shall be reviewed in unison with the overall fire strategy for each building and installation. Provide battery operated or otherwise contingency powered emergency lighting systems and illuminated exit signs as required by applicable fire and life safety codes.

3-1.19 Communications and Data

Consult with the Communications Squadron at each installation for base specific requirements and guidelines. Due to the technical nature and rapidly changing communications and data requirements, refer to the following sources for detailed guidelines and specifications:

- ETL 2-12, *Communications and Information System Criteria for Air Force Facilities*
- AFI 33-104, *Base-Level Planning and Implementation*
- *USAFE Information Technology Architecture* (Latest Edition) for USAFE installations

- UFC 4-021-01, *Design and O&M: Mass Notification Systems*

Provide junction boxes with rigid conduit to the ceilings and walls or other required infrastructure for telephone and data connections. Telephone and data outlets may be independent of each other or combined into a single junction box. If these connections can be combined into a single junction box, the cover plate to that junction box must allow for multiple connections. Confirm the preference for individual or combined telephone and data outlets with installation specific contacts. Consider the need for a communications equipment room inside the building, separate from the mechanical and electrical rooms. Consider the need for future communication and data drops.

3-1.20 Interior Design

Interior surfaces, details, finishes, fixtures, and fittings should be carefully selected for resistance to wear, impact, and vandalism. Use experienced professional interior designers and select surface materials and furnishings through the use of structural interior and comprehensive interior design services. Include a request for such services in the Requirements Document. Interior design selections shall be based on consideration of anticipated use, maintenance characteristics, life cycle cost, fire protection, and other safety requirements. Refer to the *Air Force Interior Design Guides*, ETL 03-3 - *Air Force Carpet Standard,* MAJCOM specific interior design guidelines, and base specific architectural compatibility guidelines or facilities excellence standards for additional information. All interior design elements should be developed as an overall scheme, whether they are furnished and installed under the construction contract or provided later by the user. Accent colors may be used to add visual interest, unify the interior design elements, and identify functional design elements and their respective areas. Selection of colors must consider desired light levels, lighting sources, reflectivity, emotional responses to colors, and other interior design elements.

3-1.21 Furniture, Fixtures, and Equipment

Choose interior furniture, fixtures, and equipment (FF&E) that is durable, comfortable, and attractive. Consider modular or systems furniture components that match for the office, service desk, and classroom. Service counter fronts are high maintenance and require highly durable materials because of wear and tear. Consider metal, solid surface, or composite materials for the front counter panels and tops. Provide corrosion and graffiti resistant furniture and materials in the customer waiting room and classroom.

3-1.22 Interior Signage

Interior signage is important to support the functionality of the facility and for wayfinding. Use colors, textures, and finish materials on the walls and floors to help define circulation patterns. Use signs with words and graphic symbols, where appropriate. Interior signage shall comply with ADA requirements for the visually impaired. Interior signage should be horizontal only and in upper and lower case text, except where specifically required to be in all capital letters according to ADA requirements. An interior signage system should be developed in accordance with UFC 3-120-01, *Air Force Sign Standard*. Provide interior AFSVA identification and branding signs as required by the current *Services Signage Enhancement Program*.

Include signage and graphic design as part of the overall design to identify activities and facilitate functional effectiveness. Include signs for building and room identification, direction, information, and warnings. Weigh carefully the cost of maintaining wall painted graphics against the number of times repainting would occur. Prominently post rules for the operation of each shop or area, safety rules, and the consequences of non-compliance to inform customers regarding their liability for the negligent use of tools or equipment. Post "no smoking" signs in accordance with the installation smoking policy. Display signs giving time limits of projects and the rules for the disposal of projects or vehicles left past the allocated time limit, unless previous arrangements are made. Provide signs identifying noise hazard areas according to requirements of the Occupational Safety and Health Administration (OSHA). Provide additional signs and identification markings according to the OSHA Standards 29 and other requirements including:

- CFR 1910.144, *Safety Color Code for Marking Physical Hazards*
- CFR 1910.145, *Specifications for Accident Prevention Signs and Tags*
- CFR 1910.147, *The Control of Hazardous Energy (Lockout/Tagout)*
- Mil-Std 101B, *DoD Color Code for Pipelines and Compressed Gas Cylinders*

3-1.23 Acoustical Requirements

Acoustical design concepts should provide an environment in which unwanted sounds are controlled, dissipated, and/or absorbed. Examine noise relationships between activity areas and provide appropriate acoustic protection, where needed. Incorporate noise reduction techniques, as needed, to eliminate distractions. Noise, especially that emanating from the woodshop or compressor room, can disrupt activities taking place elsewhere in the facility. To overcome such problems, each major studio area in the arts and crafts center should be acoustically isolated from its neighbors and separately controlled with respect to humidity, dust, and ventilation. Sound absorbent materials shall be used on ceilings and walls and sound insulation pads provided under the bases of rotating, vibrating, or impact machinery. Zone quiet activity spaces away from noisy activity areas. Modulate interior noise generated within a room or space. Acoustical ceiling tiles should be provided throughout a majority of the arts and crafts center spaces to help control noise. Acoustical panels should be provided, where necessary, to meet acoustical criteria. Consider the use of cloth banners to modulate noise, absorb sound, add color and visual interest, and help provide wayfinding cues. Provide solid core doors and weather stripping for openings into noisy areas. Provide acoustical baffles in all ductwork that penetrates sound attenuating partitions. Avoid back-to-back electrical outlet boxes.

3-1.23.1 Table: Acoustical Requirements

	Maximum Expected Sound Level	Ambient Noise	Sound Insulation	Sound Absorption
	PWL	PNC	STC	NCR
General Arts & Crafts Studio	60	34 - 45	50 - 60	60 - 80
Woodworking Studio	100	35 - 45	50 - 60	60 - 80
Framing Studio	60	34 - 45	50 - 60	60 - 80
Computer Studio	50	35 - 45	43 - 50	30 - 40
Graphics Studio	50	35 - 45	43 - 50	30 - 40
Support Spaces	40	35 - 45	43 - 50	30 - 40
Ceramics & Pottery	50	35 - 45	43 - 50	30 - 40
Photography	50	35 - 45	43 - 50	30 - 40
Auto Hobby Shop	100	35 - 45	50 - 60	60 - 80

PWL = Magnitude of Sound
PNC = Preferred Noise Criteria
STC = Sound Transmission Class
NRC = Noise Reduction Coefficient

* All of the above are measured in decibels

3-2 ARTS AND CRAFTS CENTER DESIGN

The ongoing activities in an arts and crafts center can be grouped in three categories:

- Supervised
- Assisted
- Fee-For-Service

These categories can not take place without a qualified staff member present. Equipment certification is also required before some equipment can be used by customers. Any space supporting supervised or assisted activities shall therefore be securable and be configured so as to minimize the number of doors that must be locked to render it "off limits." An example of an activity requiring supervision is the use of power tools in the woodshop. Fabricating frames to order represents a common fee-for-service enterprise.

3-2.1 Site Design

The public parking lot of an arts and crafts center shall be adjacent to the public building entrance. Paving material may be bituminous concrete (asphalt) or Portland cement concrete (PCC) as required by base standards or the project budget. Consider the use of other paving materials, such as crushed granite or paver stones, that are not as impervious to rain water as concrete. Unit paver materials may also be utilized for walkways and other hardscape areas. Paths leading from the parking lot to the building entrance shall be paved and accessible to people with disabilities. Service vehicles may require a dedicated service drive or they may use the parking access road, but shall be routed away from public parking areas. A delivery and loading area servicing the loading dock, service entrance, and garbage dumpsters shall provide adequate space for trucks to turn around and back up to the building.

3-2.2 External Circulation

The external circulation system shall consist of an access road, vehicle drop-off, parking lot for staff and customers, connections to on-site walkways, and service drive. Consider a loop road or similar drop-off and pick-up area in front of the facility. Locate bus stops and shelters conveniently near the arts and crafts center with direct sidewalk access to the main entrance. No more than two public building entrances, each opening directly onto the central lobby, shall be provided to facilitate supervision from the service desk and the administration areas. A single entrance serving both the parking area and street shall be provided where site conditions permit. A service entrance and loading dock area are required outside the woodshop for lumber and materials delivery and trash and sawdust removal. Consider the need for a service entrance outside the frame shop. Loading dock and truck turn-around areas shall be configured so as not to obstruct public traffic and walkways. Provide a concrete apron for garbage dumpsters adjacent to the service drive. The service access shall be at least 3.048 meters (10 feet) wide with space at the end to allow garbage trucks and other service vehicles to turn around and back up to the loading dock.

3-2.3 Parking

Parking areas should be located within sight of the public entrance and as close as possible to the entrance as allowed by current AT/FP setbacks. Refer to UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings* and other MAJCOM specific standards for detailed AT/FP information. Vehicles parking spaces for people with disabilities and curb cuts at walkways shall be provided in compliance with ADA and ABA requirements. Service vehicles will use the parking access road but shall have a separate turn-around area, preferably screened from view by landscaping. Bike racks shall be located so that bicycle traffic does not interfere with pedestrian or vehicular traffic. Parking areas should not dominate the building entrance and should be located to the sides of the building, where possible. Provide adequate light levels at night in all parking areas for security and safety. Consider the need for a dedicated staff parking area that is located near the staff only entrance to the building. Spaces for motorcycles and bicycle racks should also be provided as required by the base population. Locate bicycle racks near the main entrance in a secure location. The recommended number of parking spaces and overall size of the parking lot based on 372 sq. meters (400 sq. feet) per space is based on one parking space for every 100 persons on base.

3-2.4 Outdoor Facilities

Sanding furniture, raku-firing, and art welding are some of the projects that, weather permitting, are better pursued outdoors. Each activity that places the heat and fumes it may generate and its participants outside helps relieve overcrowding in the center at peak times. In warmer climates, a hard surface outdoor workspace is a relatively inexpensive way to increase a facility's usable square footage. Consider the need for a partially covered area adjoining the building that has at least one sheltered workbench. Exterior light fixtures and waterproof outlets are required. A securable perimeter fence or screen wall can resolve any need for monitoring such areas. Covered outdoor spaces shall be considered in climates where the temperature, humidity, and wind conditions allow comfortable use at least 100 days of the year. The comfort index shall be figured in the range between 35 degrees Celsius (95 degrees Fahrenheit) with 45% relative humidity and 18 degrees Celsius (65 degrees Fahrenheit) with 75% relative humidity with wind velocity measuring 16 kph (10 mph) or less.

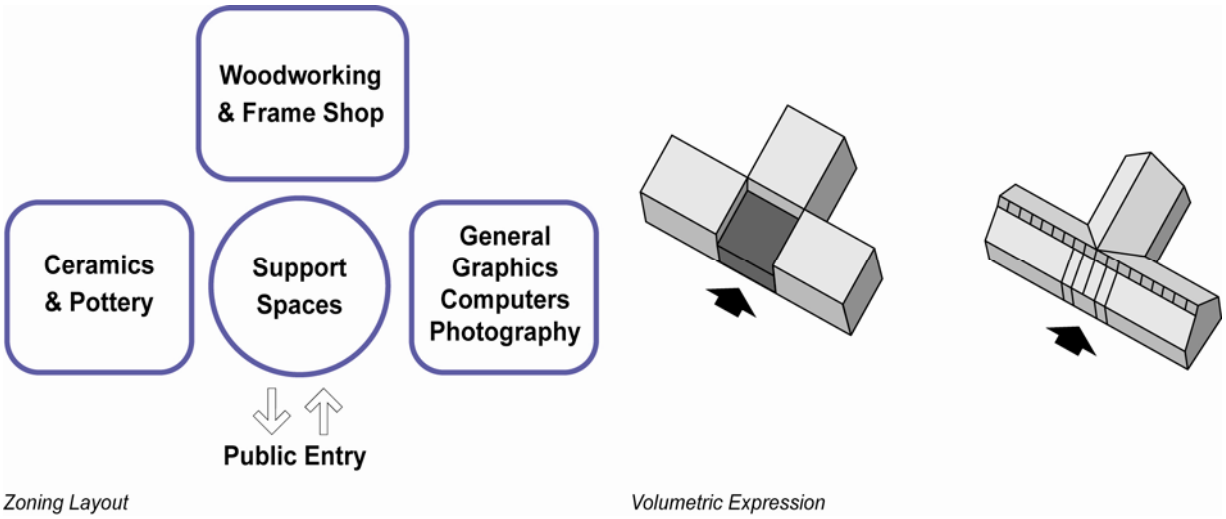
3-2.5 Building Design

Main entrances should open directly onto the central space to provide access to the various public support and activity areas. Facilities adjacent to the gallery/lobby include the sales store, all general arts and crafts studios, multi-purpose rooms, restrooms, coat closet, classroom, and library/lounge. These areas act together as a central service hub for the various studios and workshops. Direct access from the lobby to each activity area is required. Transitional spaces outside each activity area equipped with flush-to-floor mats to prevent the spread of ceramic powder or sawdust, bulletin boards for posting announcements, and built in lockers for "student" storage are highly recommended. The internal layout of the lobby can vary but may include an announcement board, a central stepped display space for exhibiting ceramics, small sculpture, and/or a lounge area.

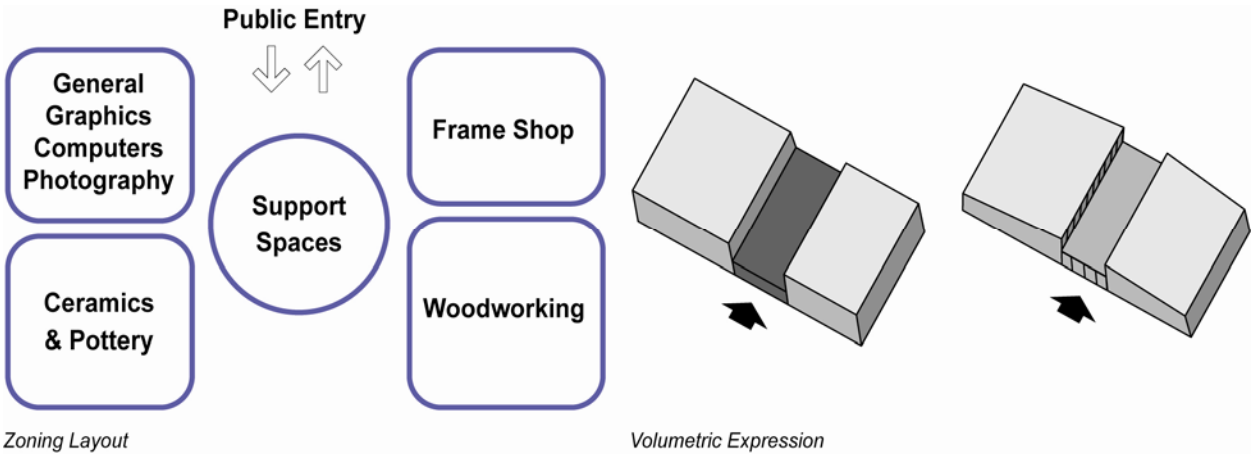
3-2.6 Building Organization

Designs shall be formed by creatively organizing the components of the project on the basis of an architectural concept for the specific site. The diagrams in Figure 3-2.6.1 describe sample concepts based on organization principles that fulfill the design objectives. Most evident is adherence to those form-giving objectives requiring a compact circulation scheme, access, environmental zones, and controlled day lighting. Specific project requirements will vary from these examples, requiring additional analysis for the particular design. The sales store shall be visible from the public entrance and open onto the lobby in a conspicuous way. The layout of these adjoining spaces must permit one person to monitor the store and lobby, and have access to all activity areas. To provide efficient but secure user circulation in the facility, the spaces shall be arranged for accessibility and supervision as described in this UFC.

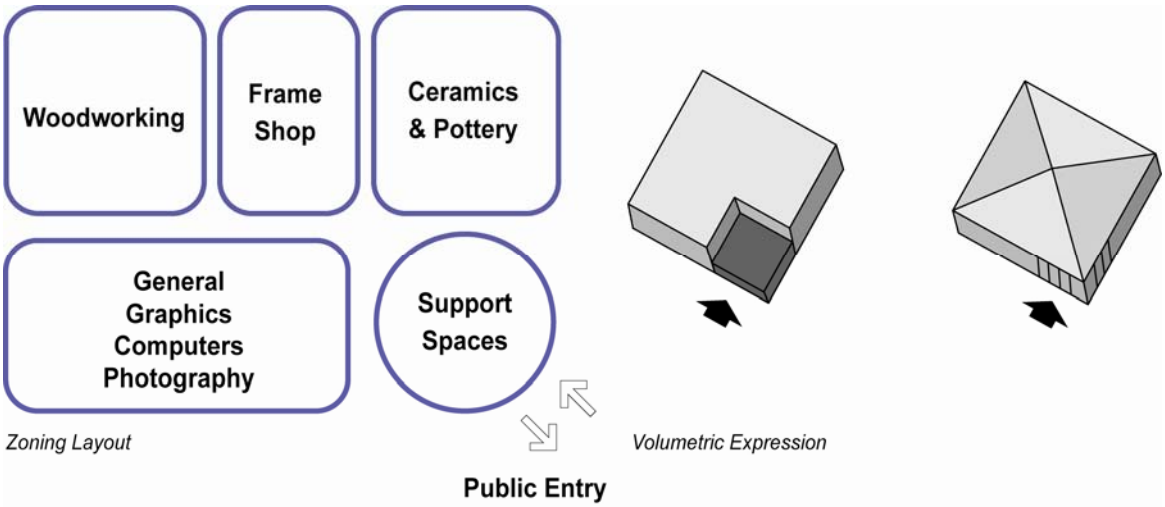
3-2.6.1 Figure: Building Organization Principles



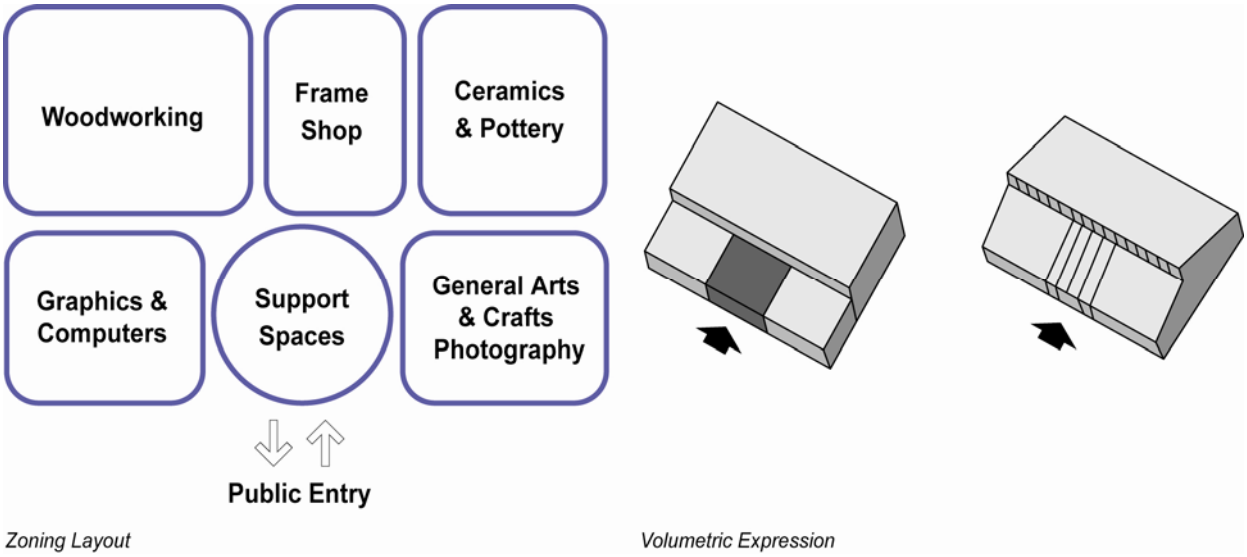
3-2.6.2 Figure: Building Organization Principles



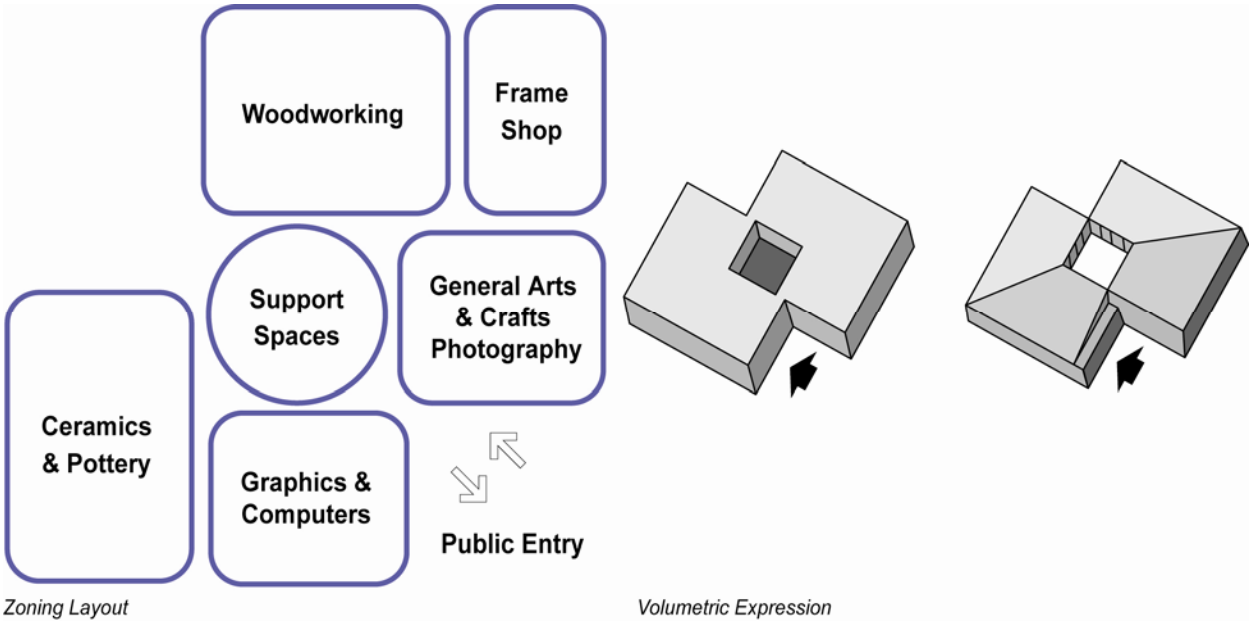
3-2.6.3 **Figure: Building Organization Principles**



3-2.6.4 **Figure: Building Organization Principles**



3-2.6.5 **Figure: Building Organization Principles**



3-2.7 Building Circulation

A compact circulation scheme meets two basic needs. It maximizes net usable square meters (feet) and minimizes staff legwork. A lobby "hub" with direct access to all studio spaces is therefore required. Intervening corridors longer than 7.62 meters (25 feet) shall be avoided. The sales area, frame shop, restrooms, and project lockers shall all open onto this central space. At least one uninterrupted wall surface shall be provided in this area for display purposes, as the exhibition of "student" work is seen as a vital part of the arts and crafts program.

3-2.8 Supervision, Safety, and Security

Staff limitations often dictate that one person monitor an entire facility. Since the sales store, and specifically the cash register, cannot go untended, the store manager or clerk typically doubles as supervisor. If the sales counter is to serve effectively as the lookout, several conditions must be met. The sales store shall open directly into the lobby and be in clear line of sight of the counter.

3-2.9 Flexibility and Expansion

As programs and user preferences change, so will the "menu" of courses offered at an arts and crafts center. Flexibility, whether on a daily or yearly basis, prolongs the usefulness of the facility and the spaces within it. Rooms designed and equipped specifically for a given craft thwart the need for time and space sharing. Multi-purpose studios that lend themselves to rapid turnover among various crafts and class sizes support that need. Such spaces have a general work area divisible by folding partitions and surrounded by storage alcoves amply sized for stowing easels, looms, and works-in-progress. A large sink, tackable wall surfaces, and electrical outlets at counter height

all contribute to an environment adaptable for a wide range of uses without requiring major remodeling.

3-2.10 Project and Material Storage

Ample storage areas for in-progress projects are required for all studios and the woodshop. These storage areas may include closets, cabinets, shelving, under counter storage areas, and other areas to maximize the storage opportunities in each space. Storage closets and cabinets shall be adjacent to the activity area they support, and dimensioned to fit the contents. Store lumber and molding horizontally on full length shelves to prevent warping.

Store Lumber and Molding Horizontally to Prevent Warping

Provide Plenty of Storage Areas in All Studios

3-2.11 HAZMAT Recovery and Storage

Arts and crafts centers house a number of activities best described as environmentally incompatible. The high humidity arising from the curing of clay, for example, can warp the lumber stored in the woodshop. The dust created by either of these enterprises is a menace to film processing and photo enlarging. Dust and fumes, in general, are a potential health hazard for all occupants in the center. Noise originating from the woodshop can disrupt activities taking place elsewhere in the center. To overcome such problems, each major studio area should be acoustically isolated from its neighbors and separately controlled with respect to humidity, dust, and ventilation. Flush-to-floor mats at each studio entrance further curb the passage of dust throughout the facility. Provide specialized hazardous material storage containers and fire-proof metal cabinets. The best way to remedy incompatible activities or facilities is to provide area separation walls, or develop a plan for physically separating the activities, such as a campus of buildings grouping compatible activities in the same building. Provide emergency eye wash stations according to OSHA requirements.

Provide Fire-Proof Metal Cabinets for HAZMAT Storage

Provide Saw-Dust and Fume Removal Equipment

3-2.12 Special HVAC Requirements

HVAC systems shall be sized and designed to solve humidity, dust, and noxious fume problems as they occur in workshops, ceramics and pottery, graphics and silk-screen areas, and the photo lab (if provided). The extent of the HVAC system shall be determined by the weather zones referenced in UFC 3-410-01FA, *Design: Heating, Ventilating, and Air Conditioning*. Arts and crafts facilities may be air conditioned as indicated, provided that functions requiring high ventilation rates or high heat release (such as metal and woodworking shops and kilns in ceramics studios) are not air conditioned. Air conditioning is allowed in all zones when purchased entirely with non-appropriated funds. Toilets and mechanical rooms shall not be air conditioned regardless of climatic conditions. The heating system shall be zoned to provide consistent temperature levels in spaces subject to different solar exposures and heat gain. Inside heating design dry bulb temperatures shall be 19 to 21 degrees Celsius (67 to 70 degrees Fahrenheit). The room supply air rate shall not be less than 80 CFM per square foot of occupied floor space. The outside air ventilation shall be at least 6 CFM per square foot at times when the outside temperature is warmer than the building space and 5 CFM per square foot at times when the outside temperature is cooler than the building spaces. When allowed, evaporative cooling shall provide a maximum indoor temperature of 27 degrees Celsius (80 degrees Fahrenheit) dry bulb. Where air conditioning is allowed, the inside comfort design temperature shall be 9 degrees Celsius (15 degrees Fahrenheit) less than the 2.5 percent outside dry bulb weather conditions but shall not exceed 25 degrees Celsius (78 degrees Fahrenheit) or less than 50 percent or equal to the outside air dew point design temperature.

3-2.13 Special Electrical Requirements

General convenience receptacles and special power outlets must be specification grade. General spacing of convenience receptacles must be a minimum of 3.65 meters (12 feet) on center located along the walls. Provide special power outlets and circuits for all user furnished equipment and hand tools, as required. Provide outlets in studio work areas. Provide the following power:

- 120V 60Hz Single Phase AC current, on a 20 amp circuit, if available
- 208V Three Phase AC current for heavy duty fans, air compressors, and other similar type equipment

- 240V and 480V power as needed, dependent on installed equipment requirements

3-2.14 Interior Finishes

Studio spaces are workshops and should be constructed of simple materials that are easily cleaned under normal conditions and easily repaired if damaged. Hard to reach ledges, heavily textured surfaces, and unsealed floors all stain, attract dust, and shall be avoided. In general, all materials and finishes shall be non-porous, durable, and cleanable. For example, floors should be sealed concrete, walls should be painted masonry, and ceilings should be painted gypsum board (off white walls and neutral colored floors are preferred in the 2-D design space). Avoid unsealed floors and other materials that attract dust and stains. Areas for tack-up shall be included in fabric craft and 2-D design spaces. Coordinate material, finish, color, texture, and furniture selections to compliment the overall building design and image. Select surface materials and furnishings to express a warm, intimate, and relaxed atmosphere. Use local materials to the greatest extent practicable to reinforce the user's sense of place or region.

3-2.14.1 Table: Suggested Finish Schedule

	Flooring	Walls	Ceilings
General Arts & Crafts	Tile	Gypsum or CMU	Acoustical Tile or Gypsum
Woodworking Studio	Sealed Concrete	CMU	Exposed
Woodworking - Tool Issue	Sealed Concrete	Gypsum or CMU	Acoustical Tile or Gypsum
Framing Studio	Tile	Gypsum or CMU	Acoustical Tile or Gypsum
Computer Studio	Tile	Gypsum or CMU	Acoustical Tile or Gypsum
Graphics Studio	Tile	Gypsum or CMU	Acoustical Tile or Gypsum
Support - Office	Carpet	Gypsum	Acoustical Tile or Gypsum
Support - Classroom	Tile	Gypsum or CMU	Acoustical Tile or Gypsum
Support - Lobby & Gallery	Tile or Carpet	Gypsum	Acoustical Tile or Gypsum
Support - Vestibule	Tile	Gypsum or CMU	Acoustical Tile or Gypsum
Support - Storage	Sealed Concrete	Gypsum or CMU	Acoustical Tile or Gypsum
Support - Sales Store	Tile or Carpet	Gypsum	Acoustical Tile or Gypsum
Support - Restrooms	Tile	Tile	Acoustical Tile or Gypsum
Support - Library/Lounge	Tile or Carpet	Gypsum or CMU	Acoustical Tile or Gypsum
Ceramics & Pottery Studio	Tile	Gypsum or CMU	Acoustical Tile or Gypsum
Photography Studio	Tile	Gypsum or CMU	Acoustical Tile or Gypsum

3-2.15 Flooring

Flooring choices should be durable and easy to maintain. Utilize non-skid ceramic tile, sealed concrete, or other skid resistant material for floors for most studios and public areas. Carpet may be used in some areas like private offices that don't get as dirty as studio spaces. Consider using carpet in areas like the sales area and gallery to help

control noise. Comply with the guidelines of the latest *Air Force Carpet Standards* located on the AFCESA website. Ceramic tile is the preferred flooring material for bathrooms, lobbies, and vestibules. Ensure that flooring materials comply with applicable AF, MAJCOM, and installation specific criteria. Floors in the woodshop must be sealed concrete which is impervious to moisture and stains. Specialized slip prevention measures must be provide in the woodshop, especially around dangerous equipment.

3-2.16 Interior Walls

Studio walls must be durable, impervious to either water and/or grease, and easily washable. Broad, uninterrupted wall surfaces are preferred as display backdrops for projects and artwork. Provide wall surface finishes in areas where displays are mounted and changed frequently. Walls may be composed of gypsum wallboard on steel studs, CMU walls, plaster on CMU walls, or other similar systems. Use durable wall materials in spaces, such as the sales gallery, classroom, computer studio, and offices for additional protection. Gypsum walls should utilize a slightly textured, eggshell finish and be painted with the base standard interior wall paint color. Walls in hallways should be painted the base standard interior color without chair rail trim and vinyl wainscots.

3-2.17 Ceilings

Acoustical ceiling tiles may be utilized for administrative and similar facility spaces. Do not use acoustical ceilings in the woodshop or other studio spaces used for glassblowing, metal art, and similar hazardous activities. Consider using a tile with .85 noise reduction coefficient (NRC) for large, open spaces and quiet rooms. Acoustical panels should also be provided, where necessary, to meet acoustical criteria. Consider the use of cloth banners to modulate noise, as well as add color, interest, and wayfinding cues. Gypsum ceilings may be utilized in most studio areas to conceal structural beams that accentuate the built environment, interior architectural features, and improve the functionality of specific areas. Ceilings in woodshops may be open to structural elements, roof materials, and HVAC elements, but should include noise mitigation and insulation measures.

3-2.18 Interior Day Lighting

Windows and/or skylights shall be provided for the general arts and crafts and ceramics studio, the woodshop, and the gallery lobby. Since all of these spaces share the need for tackable wall surfaces, clerestory glazing or skylights are encouraged. Blinds, overhangs, and translucent glazing materials shall be used, as necessary, to diffuse direct solar penetration and control glare. If the glass exceeds 15% of the area served (maximum depth from outside wall is 6 meters or 20 ft.), then an energy analysis will be required to determine if the additional glass will increase building energy heating and/or cooling requirements. Windows and/or skylights are advised for all spaces except storage rooms, restrooms, and mechanical rooms.

3-2.19 Artificial Lighting

Since most arts and crafts activities require decisions involving color, light fixtures in the studio spaces and gallery/lobby shall be balanced to optimize true color rendition. Illumination shall be uniformly distributed in each studio space at a minimum of 50-foot candles of light measured 1 meter (3 feet) above the floor for most areas unless other

lighting requirements are identified. Utilize incandescent and fluorescent fixtures with low temperature, energy efficient ballasts with readily available color corrected bulbs that minimize glare and shadowing. Adjustable task lighting fixtures mounted along counters in the craft alcoves are required, especially in the glazing area, to raise light levels to 80-to 100-foot candles, depending upon the work performed. Ceiling mounted spot fixtures on separate dimmer control switches are recommended for exhibit purposes.

Woodshops require a minimum of 75-foot candles of shadow-free, glare free illumination measured 1 meter (3 feet) above the floor for safety reasons. Shop light fixtures shall be mounted a minimum of 3.65 meters (12 feet) above the finished floor so that large scale projects and boards carried overhead will clear them. Fixture locations shall be carefully coordinated with ductwork so as not to obstruct light or cast shadows. Task lighting for fixed power equipment, such as the band saw, is typically an integral component of the machine. Lighting levels elsewhere in the woodworking area shall be achieved with fluorescent fixtures delivering 75-foot candles of light to the work surface.

All fixtures shall be capable of independent switching per room or studio space and be located to allow for re-lamping with, at most, the aid of a portable ladder. Indirect lighting systems utilizing high intensity discharge or fluorescent fixtures may also be used, where practical. Where natural light is available, provide lighting control systems, including ambient light dimmers to automatically reduce the intensity levels of artificial lighting. Select lighting fixtures that require lamps readily in use at and available to the base in accordance with the facilities excellence standards at each installation. Interior lighting for new construction shall meet the current codes and the applicable recommendations of the Illuminating Engineering Society of North America (IESNA). Renovation of existing interior lighting shall meet the current recommendations of the IESNA to the extent possible. Additional guidance for lighting renovation in federal buildings may be found on the Federal Energy Management Program (FEMP) website.

3-2.20 Communications and Data

Provide at least one telephone and data outlet in each staff office, woodshop tool issue office, and at the sales store service desk. Include connections at the service desk for credit card sales connections. A public telephone shall be located in or adjacent to the lobby. Provide high speed Internet connections for all offices, multi-purpose rooms, classrooms, and at the service desk. Multiple computer terminal stations with data and high speed Internet connections are required for the computer studio as determined by the program requirements for each facility.

3-2.21 Audio/Visual (A/V)

A centrally controlled public address and two-way communications system is required for the arts and crafts center facility. At least one public address speaker shall be provided in each room except storage closets, restrooms, kiln room, and mechanical rooms. A speaker shall be provided for every 74.3 square meters (800 square feet) of net floor area and a minimum of one outdoor speaker shall be located at the outdoor patio or terrace. At least one two-way communication station shall be provided at the entrance of every activity, support, and staff space. Incorporate a public address (PA) capability with the phone system to allow paging from all staff phones, where possible.

Refer to UFC 4-021-01, *Design and O&M: Mass Notification Systems* for additional information.

3-2.22 Compressed Air

Locate air compressors within a separate room to help minimize noise levels with air lines going to the frame, engraving, wood, and ceramic shops. This room must have adequate exhaust ventilation systems. Provide air outlets in Do-It-Yourself (DIY) areas, classrooms, and employee work rooms. Air lines can be located on ceiling runs with overhead reel assemblies for customer convenience to prevent the tripping hazards of cables and hoses spread around the floor. Air powered equipment is used in these operations, such as frame choppers, assemblers, mat cutters, screw guns, nail guns, sanders, and painting air brushes. Compressed air is also needed for cleaning equipment and is mandatory to operate standard equipment items. Comply with all OSHA requirements regarding hearing protection for loud machines and equipment.

3-3 AUTO HOBBY SHOP DESIGN

Just like the arts and crafts centers, the ongoing activities in an auto hobby shop can be grouped in three categories:

1) Supervised
2) Assisted
3) Fee-For-Service

Equipment certification is also required before some equipment can be used by customers and supervision of customer activities is a key component for operations and facility design.

3-3.1 Site Design

Many operations performed in an automotive hobby shop are light industrial. Therefore, it may be necessary at some installations to locate these facilities near compatible operations. The noisy operations, vehicle storage requirements, and security fences needed for these facilities must not create a nuisance in residential or community support areas. Public or visitor parking areas may be separated from the customer parking areas and long term vehicle storage. The public parking lot shall be adjacent to the public building entrance and paths leading from the parking lot to the building entrance shall be paved and accessible to people with disabilities in accordance with ADA and ABA requirements.

Service vehicles may use the same customer entrance to the site, but shall be routed away from visitor and customer parking areas. Site size depends upon gross building square meters (footage) and parking requirements, plus landscaping and site development requirements. For preliminary site planning, use 32.52 square meters (350 square feet) per car for lanes, turns, and stalls. The final layout can vary from 27.87 to 46.45 square meters (300 to 500 square feet) per car. Provide adequate parking areas for long term vehicle storage according to the capacity anticipated by the facility director. Locate the building to take advantage of positive and protect against negative climate and micro-climate conditions. Examples may include considering heat gain from the sun and heat losses from prevailing winds. Preserve and use natural site features, such as topography, foliage, and rock outcroppings. All water drainage for the site must be connected to an oil-water separator.

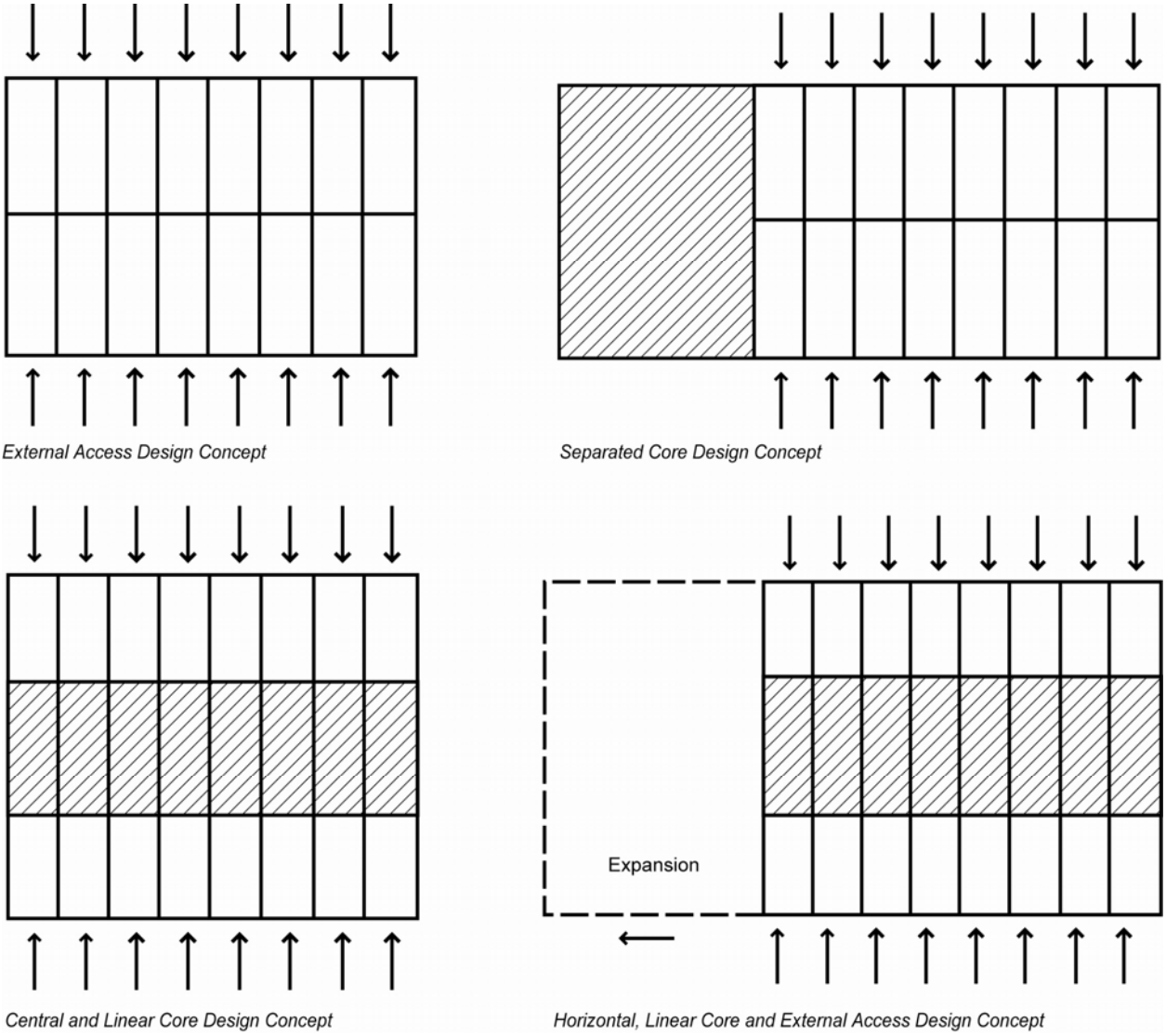
3-3.2 Vehicle Circulation

Provide easy access by automobile and base traffic. One-way drives with a straight approach and a minimum of 3.65 meters (12 feet) wide are preferred. However, the vehicle entrance to the facility should not be directly from a major thoroughfare. Vehicular access patterns should not pass through residential areas.

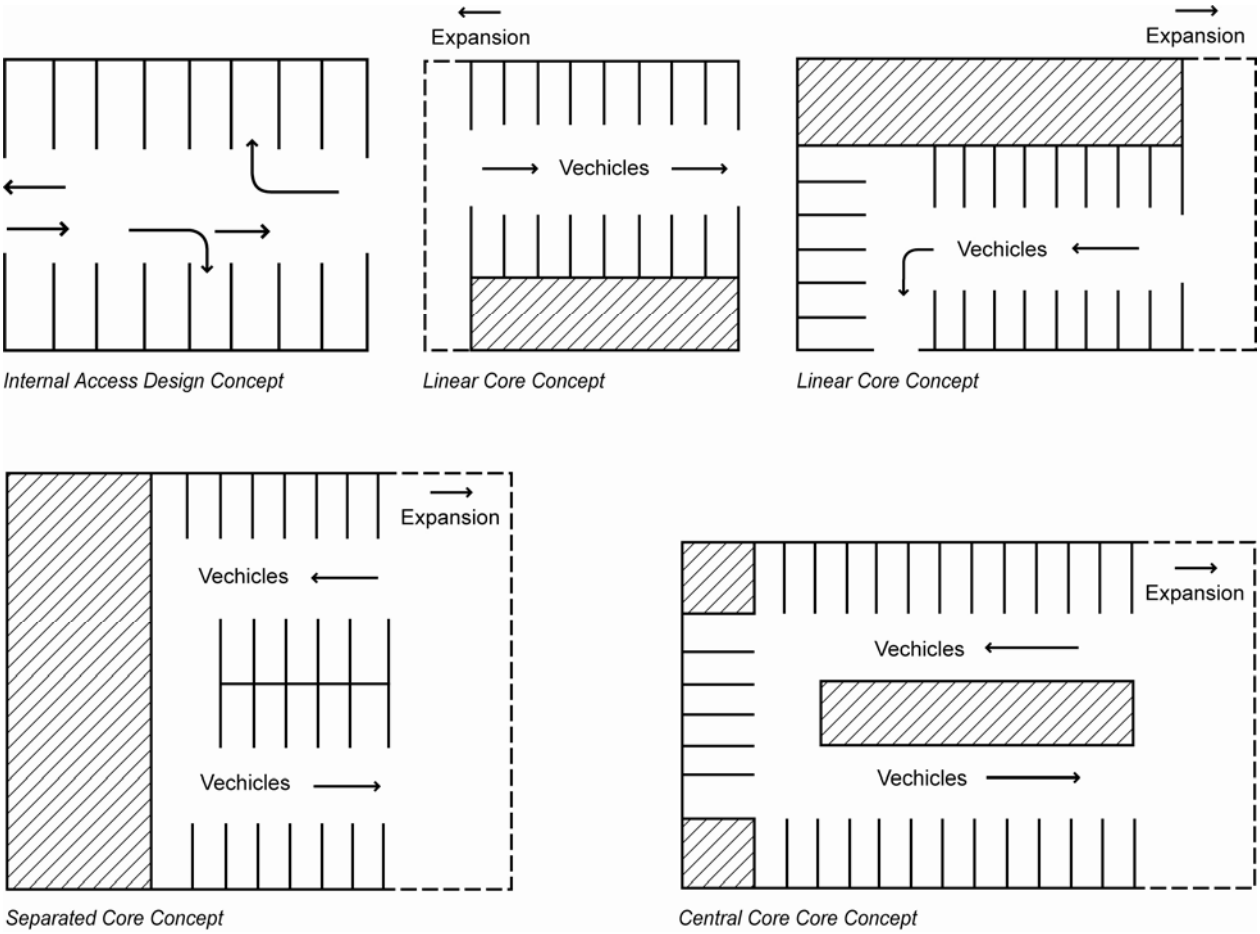
External access design concepts should provide direct access to stalls thereby eliminating the need for indoor aisles. However, this increases the number of exterior doors. Layouts using external access have the advantage of excellent natural ventilation in warm weather and a minimum amount of space used for interior vehicular circulation. Disadvantages include high heat loss in cold weather, high initial expense

of overhead doors, a long distance between the core area and some repair stalls, and poor control of vehicles entering or leaving the building. Internal stall access designs place support functions in a committed space isolated from work areas and require less doors.

3-3.2.1 **Figure: External Vehicle Circulation Design Concepts**



3-3.2.2 **Figure: Internal Vehicle Circulation Design Concepts**



3-3.3 **Parking**

Parking areas should not dominate the building entrance and should be located to the sides of the building, where possible. Provide adequate light levels at night in all parking areas for security and safety. Consider the need for a dedicated visitor parking area that is located near the main entrance to the building that is outside the secured fencing and gates for customer vehicles and long term vehicle storage. Spaces for motorcycles and bicycle racks should also be provided as required by the base population. Consider the location of bicycle racks near the main entrance in a secure location. The parking lot and all paved site surface areas shall be Portland cement concrete (PCC) for environmental purposes. Bituminous concrete (asphalt) paving is not acceptable. Maximum slope away from the building for parking aprons and driveways should be 15 percent.

Customer and visitor parking must be convenient to the shop entrance and must not interfere with the flow of vehicles in and out of the facility. Avoid entrance driveways with sharp turns. Base the total number of parking spaces on one space per 28 square meters (300 square feet) of floor space in the building. Assign one-third for patrons and two-thirds for secured parking. Accessible parking must be within 61 meters (200 feet) of the entrance provided for people with disabilities in accordance with ADA and ABA

requirements. Spaces must be according to the accessibility requirements identified in Section 2-1.6, *Accessibility* with direct level access to the facility without curbs or stairs. Score concrete surfaces to provide increased traction. Avoid use of surfaces that are affected by solvents.

3-3.4 Long Term Vehicle Storage

Provide fenced and screened areas paved with bituminous concrete for outdoor work and long term vehicle storage. Include security measures, such as outriggers with barbed wire at the top and intrusion detection systems, where required, to prevent theft and vandalism. Storage of POVs being repaired must be arranged with the facility manager. Abandoned POVs on base may be given to the auto hobby shop at the discretion of the installation commander, including authorization to sell parts.

3-3.5 Vehicle Resale Lot

Consider the need for a resale lot for POVs outside the grounds of the secured facility. These lots are installation specific and may not be collocated with the auto hobby shop.

3-3.6 Entry Gates

Provide a lockable gate at the vehicular entrance(s) to the facility site. At a minimum, provide secure gate access to the customer and long term vehicle storage areas. In facilities with 15 or more stalls, include an outdoor remote call station at the vehicle entrance connected to the office for notifying staff of patron arrivals and for assigning work stalls.

Entry Gate with Remote Call Station

Screen Fencing and Walls

3-3.7 Fencing and Walls

The entire site must be secured with a fence or security walls except for the visitor parking and car wash areas, which may be available for use when the auto hobby shop is closed. Provide lockable vehicle and pedestrian gates at the entrance/exit to the secured parking areas for customers and long term vehicle storage. Fence repair cubicles on all sides except the entrance, which must have lockable or in-swinging gates. Fencing and walls must be compatible with the base facilities excellence standards regarding materials, colors, and function. Steel mesh fencing with a plastic coating designed for military installations is hard to cut and is more secure and aesthetically pleasing than chain link. Avoid the use of chain link fencing, where possible. Provide visual screening of cars under repair and for equipment, like recycled

oil and antifreeze containers. Consider the need for security measures, such as outriggers with barbed wire at the top of the perimeter fence and intrusion detection systems, where required, to prevent theft and vandalism.

3-3.8 HAZMAT Disposal, Recovery, and Storage

Provide oil-water separators to collect drainage and spillage containing oily wastewater from the facility operation. All drainage for the building and parking areas must be filtered through an oil and water separator. Connect the effluent from the separators into the base sanitary sewage system where allowed by environmental and regulatory requirements. Stringent regulations also exist regarding water discharged into sewage systems in seismic areas. Check these requirements when planning this type of facility. Provide storage containers for recycled oil and antifreeze on the outside of the building with easy access for collection trucks. Include adequate protection against toxic fumes and acids, gasoline, oil, and grease spills. Provide emergency eye wash and shower stations near the battery charging area and centrally located inside the shop. Make adequate provisions for disposal of waste oil in accordance with all applicable governing regulations.

Protected Exterior HAZMAT Storage Containers

Interior HAZMAT Storage Containers with Spill Containment

3-3.9 Building Design

Roof slopes must not be lower than 6 mm (one-fourth inch) per foot slope. Overhead roof structure may be exposed. Provide a single monorail and either an electric or manual hoist with a minimum 1-ton capacity on one side of shop for moving engines. Select an economical structural system based on facility size, projected load requirements, local availability of materials and labor, and wind, snow, seismic, geologic, and permafrost conditions. Design building structural modules to reflect space requirements, economy, and sub-system dimensions (e.g. ceiling grid, masonry units, framing members, etc.). Consider using pre-engineered structures for automotive hobby shops. Their attributes, such as standardization, pre-assembly of structural components, in-house engineering, and ease of assembly, may make them an economical and practical construction alternative. Use of pre-engineered buildings requires strict adherence to the manufacturer's systems and details. Changes to these can negatively affect cost effectiveness, ease of construction, performance, and maintenance. Pay special attention to coordination of local load requirements (for example seismic, wind, and snow) with the manufacturer's engineering requirements.

Coordinate between the pre-engineered building manufacturer and the general contractor (if different). Local climate, temperature, or atmospheric conditions may affect performance of buildings and components. Consider the implications regarding the quality of coatings applied to structural members, fire protection requirements, grounding for lightning protection, aesthetics, availability, and the capabilities of the local labor force. Design the building envelope for maximum energy efficiency.

3-3.10 Building Organization

In mild climates, use covered exterior work areas to increase work space area. Consider the impact of wind driven sand or rain in developing the design. Provide concrete aprons outside each stall that have a vehicle entrance door. Provide heavy duty bumper guards around all vehicle openings. Design general repair and tune-up stalls, muffler and tire shop, and lubrication stalls to ease frequent vehicle movement. Machine and welding shop should be convenient to the repair and storage areas. All materials of construction selected must be capable of withstanding the type of activity that occurs within the center and be relatively maintenance free. Coordinate the interior design with the architectural design and consider the impact of dirt and grease in planning the interior. Include signage and graphic design as part of the overall design to identify activities and facilitate functional effectiveness.

3-3.11 Building Circulation

Design traffic flow into and out of parking areas to assure maximum safety and efficiency. Design general repair stalls to ease frequent vehicle movement. Central and linear core design concepts have work areas oriented around central support facilities. Layouts using horizontal, linear core, and external access concepts provide convenient access to support facilities from the auto stalls. In warm weather, individual auto stall doors can be opened to provide good ventilation. However, the large number of doors increases heat loss in cold weather. This plan minimizes interior vehicular circulation space and permits visual control of the entire work area, although it provides no central control for vehicles entering and leaving the building. Using vertical, linear core, and external access concepts can provide a two-level layout that uses the advantages of certain site conditions. The inter-coordination of functions and activities may be difficult with this type of layout. The internal access design concept uses interior aisles for vehicular circulation and direct access to stalls. Layouts using central core and internal access concepts have a compact form with a single vehicle entrance/exit which is useful in very cold climates. Traffic flow is easy to supervise, however, some interior space is lost because of single loaded aisles and area needed for turning.

3-3.12 Vehicle Doors

Provide high quality, heavy duty, commercial doors with bollards for door and jamb protection. Do not use residential garage doors. Minimum width for single doors should be 3.048 meters (10 feet). Minimum width is 5.49 meters (18 feet) for double bay doors. Minimum height for overhead doors is 3.048 meters (10 feet). Minimum door height for large vehicle stalls is 3.65 meters (12 feet).

Sectional overhead doors are easier to maintain and repair over coiling doors. Sectional overhead doors must be closely coordinated with ceiling structures and lift clearances. Provide vision panels at eye level in sectional doors. Lower door panels

must be solid. Do not provide personnel access panels (wicket doors). Equip large vehicles stalls with roll-up coiling doors.

Provide for electric operators, where feasible. Ensure doors are properly "wind" rated for the area. Areas with high probability for hurricanes or typhoons should coordinate with local design agencies to develop requirement for their location.

Utilize Roll-up Vehicle Doors with Eye Level Vision Panels

Provide Adequate Overhead Space for Roll-up Doors

3-3.13 Supervision, Safety, and Security

Cluster the service deck, tool issue office, and storage areas for control from a central point. Protect tools, parts, and automobiles stored in the building from theft and vandalism. The proper layout of the facility, use of durable materials, security fencing, and lighting can reduce the potential for these problems occurring. Points of entrance should be lighted and designed for easy surveillance by staff and security patrols. Consider the need for closed circuit television (CCTV) cameras to facilitate surveillance of the entire facility. If needed, provide CCTV components and infrastructure, including cameras, monitors, conduit, cabling, power, and junction boxes, as required, for a complete and operational system. Place a TV monitor at the service desk where it can be easily viewed by the facility director and staff.

3-3.14 Flexibility and Expansion

Design the structural system in a manner that permits easy addition of automotive repair stalls and their support functions. Design the stalls to easily accommodate changing auto repair equipment.

3-3.15 Fire Protection and Life Safety

Fire protection systems must conform to requirements in NFPA 88B: *Standard for Repair Garages* and NFPA 30A *Code for Motor Fuel Dispensing Facilities and Repair Garages*. Automotive hobby shops are personnel support facilities and must be of type I or type II construction unless fully protected by an automatic sprinkler system. When automotive hobby shops are combined with other personnel support facilities, the dollar value limits must apply to the total facility. Arrange required exits so that the distance from any point within the facility to an exit is 61 meters (200 feet) or less. Arrange exits remote from each other to minimize the possibility of being blocked during emergencies.

Provide panic hardware on all exit doors. All exits must adhere to the latest edition of NFPA 101, *Life Safety Code*. Carbon monoxide detectors are required.

Enclose areas containing hazardous quantities of combustible supplies and services equipment (except air handling equipment) subject to possible explosion with construction of fire resistant walls according to applicable codes. Protect openings in such construction with self-closing or smoke actuated fire doors. Separate paint booths and shop areas from the rest of the facility by firewalls or partitions rated for fire resistance, as required. Properly protect openings in such walls or partitions. Any freestanding, prefabricated units, such as paint spray booths, must meet all UL and NFPA design requirements. These units must be capable of containing any accidental blaze. Finish interior ceilings and walls with Class A materials. Provide an ordinary wet pipe sprinkler system with pop-off covers in all paint booths. Protect all alarm valves from freezing. Water supply is required for installed sprinkler systems as a part of the project for new facilities. Fire hydrant spacing must be in accordance with NFPA requirements. At least one hydrant must be within 61 meters (200 feet) of the facility. Provide a complete heat detection system in all areas not covered by sprinklers. Provide supplementary manual pull stations. Install all sprinkler, detection, and alarm systems in accordance with the applicable NFPA codes.

3-3.16 Interior Finishes

All finishes must be compatible with surrounding buildings. Avoid expensive finishes. Select surface materials and furnishings through the use of comprehensive interior design services. Interior finish selections should consider the anticipated use, maintenance qualities, life cycle cost, fire protection, and other safety requirements. Coordinate material, finish, color, and texture selections to compliment the overall building design and image. Provide either interior painted or exposed finish partitions and walls. Use local materials to the greatest extent practicable to reinforce the user's sense of place or region.

3-3.16.1 Table: Finish Schedule

	Flooring	Walls	Ceilings
General Arts & Crafts	Tile	Gypsum or CMU	Acoustical Tile or Gypsum
Woodworking Studio	Sealed Concrete	CMU	Exposed
Woodworking - Tool Issue	Sealed Concrete	Gypsum or CMU	Acoustical Tile or Gypsum
Framing Studio	Tile	Gypsum or CMU	Acoustical Tile or Gypsum
Computer Studio	Tile	Gypsum or CMU	Acoustical Tile or Gypsum
Graphics Studio	Tile	Gypsum or CMU	Acoustical Tile or Gypsum
Support - Office	Carpet	Gypsum	Acoustical Tile or Gypsum
Support - Classroom	Tile	Gypsum or CMU	Acoustical Tile or Gypsum
Support - Lobby & Gallery	Tile or Carpet	Gypsum	Acoustical Tile or Gypsum
Support - Vestibule	Tile	Gypsum or CMU	Acoustical Tile or Gypsum
Support - Storage	Sealed Concrete	Gypsum or CMU	Acoustical Tile or Gypsum
Support - Sales Store	Tile or Carpet	Gypsum	Acoustical Tile or Gypsum
Support - Restrooms	Tile	Tile	Acoustical Tile or Gypsum
Support - Library/Lounge	Tile or Carpet	Gypsum or CMU	Acoustical Tile or Gypsum
Ceramics & Pottery Studio	Tile	Gypsum or CMU	Acoustical Tile or Gypsum
Photography Studio	Tile	Gypsum or CMU	Acoustical Tile or Gypsum

3-3.17 Flooring

Floors in the shop and repair stall areas must be sealed concrete that is impervious to moisture and stains. Shop floors must be sloped away from equipment to drains and/or gutters. Floor finish must be hardened and burnished. Provide oil-water separators to receive floor drainage and spillage.

3-3.18 Interior Walls

Walls in the shop area may have exposed structural elements and consist of the exterior building skin if no insulation is required due to the climate. Shop walls and trim must be durable, impervious to water, oil, grease, or chemicals, and be easily washable.

3-3.19 Ceilings

Ceilings in the shop area may have exposed structural elements and roof materials. Provide a minimum ceiling height of 4.57 meters (15 feet) in stalls with hydraulic lifts. Provide a minimum ceiling height of 5.48 meters (18 feet) for stalls servicing recreational vehicles and campers. Any stalls for these types of vehicles should be in pairs. Ceilings in offices, waiting rooms, and administrative areas should utilize moisture resistant materials like moisture resistant gypsum board, plaster, or other materials impervious to water and mildew. These ceiling heights shall be at least 2.75 meters (9 feet).

3-3.20 Interior Day Lighting

Consider the need for windows and/or skylights to provide day lighting for stalls and other general shop areas. A minimal laminated glass thickness of 6 mm (.236 inches) is required under UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings*. The laminated glass thickness requirement is 7.5 mm (.295 inches) in USAFE EUCOM *Operations Order 03-11 with FRAGO (07 Jul 04).* Blinds, overhangs, and translucent glazing materials shall be used, as necessary, to diffuse direct solar penetration and control glare. If the glass exceeds 15% of the area served (maximum depth from outside wall is 6 meters or 20 feet), then an energy analysis will be required to determine if the additional glass will increase building energy heating and/or ventilation requirements. .

3-3.21 Artificial Lighting

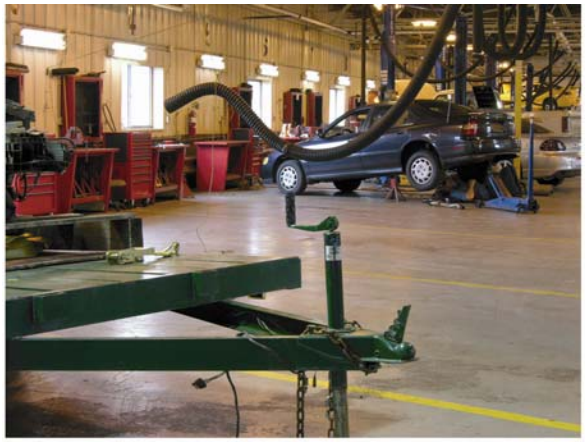
Design artificial illumination to compliment the character of different spaces. Provide variable control for various functions and levels of use. Avoid glare and brightness differences which may be disturbing or disruptive, through lighting design, color, and finish selections. General shop illumination shall be uniformly distributed in each stall and space at a minimum of 50-foot candles of light measured 1 meter (3 feet) above the floor for most areas unless other lighting requirements are identified. Shop-type fluorescent fixtures delivering 20-foot candles at floor level shall be installed in engine and other storage areas. Utilize high pressure sodium or fluorescent fixtures with low temperature, energy efficient ballasts, and day light lamps that minimize glare and shadowing. Provide pull-down or wall mounted task lighting fixtures mounted on retractable rolls above each shop stall to allow light sources to be placed inside and underneath cars, as needed.

Use indirect lighting systems of the high intensity discharge or fluorescent types, where practical. General lighting for administrative and non-shop areas should be direct fluorescent with low temperature energy efficient ballasts and day light lamps. When provided, incandescent lamps have an extended life of at least 2500 hours. Where natural light is available, provide lighting control systems, including ambient light dimmers to automatically reduce the intensity levels of artificial lighting. Lighting for new construction shall meet the current codes and the applicable recommendations of the Illuminating Engineering Society of North America (IESNA). Renovation of existing interior lighting shall meet the current recommendations of the IESNA to the extent possible. Additional guidance for lighting renovation in federal buildings may be found on the Federal Energy Management Program (FEMP) website.

3-3.22 Special HVAC and Exhaust Ventilation Requirements

Provide zone controls for maintaining different ventilation and environmental conditions in functional areas like the office areas, machine shop, and battery room. Provide positive air movement through the work areas to minimize carbon monoxide dangers. Consider items such as comfortable floor level temperatures, hot air compensation for heat loss at exterior doors, and zone heating controls. Locate shop exhaust fans throughout the stalls. An engine exhaust system is required and must be at least 203 mm (8 inches) in diameter. Exhaust systems installed under floors must be located in trenches with airtight, removable steel covers for maintenance. Flexible conduits from outlets at floor level can be connected either to tailpipes or engine. Avoid underground

exhaust ventilation systems as they are either impractical or too expensive. Use overhead exhaust systems with flexible connections brought down from above at convenient locations. A forced convection fan with automatic control and visual indicator is required to reduce pressures in the system at all times.



Exhaust Ventillation Tubes

Overhead Exhaust Ventillation

Provide a separate ventilation system for the paint booth (if utilized). Provide a separate ventilation system that removes dust and filings in the body shop work area, machine shop, and welding booths. Provide an independent exhaust system for the battery charging room and for the welding area. Consider point of source exhausts system that tie into exterior venting for welding shops. Air conditioning may be provided for the office, classroom, and waiting room, as needed, according to climatic conditions. Proper selection of mechanical and electrical systems, the use of nighttime control settings, automatic regulation of power equipment, and heat recovery systems can reduce energy consumption. Many exterior doors can make this type of facility consume large amounts of energy for heating and cooling.

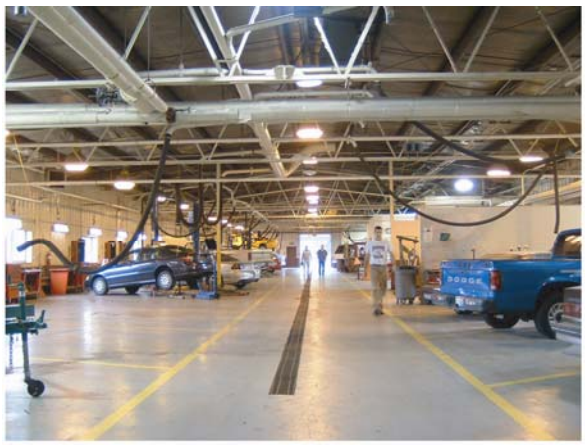
3-3.23 Special Electrical Requirements

Expose utility lines along walls above work counters and equipment for easy change and expansion, and where portable equipment can be easily connected. Requirements of NEC article 511 (Commercial Garages, Repair, Storage) apply. General convenience receptacles and special power outlets must be specification grade. General spacing of convenience receptacles must be a minimum of 3.65 meters (12 feet) on center located along the walls. Provide special power outlets and circuits for all user furnished equipment and hand tools, as required. Provide outlets on stall workbenches. Provide the following power:

- 120V 60Hz Single Phase AC current, on a 20 amp circuit, if available
- 208V Three Phase AC current for heavy duty fans, air compressors, and other similar type equipment
- 240V and 480V power as needed, dependent on installed equipment requirements

3-3.24 Special Plumbing Requirements

Locate plumbing fixtures in groups to reduce the distance of water service, waste disposal, and to combine vents. Run water pipes underground, or along walls at least 3.65 meters (12 feet) overhead so they will not be readily damaged. Oil-water separators are required on all floor and site drainage. The recommended method of capturing all floor drainage is with long interceptor gutters approximately 380 mm (15 inches) wide, covered by sectional metal grating in the middle of the building with the floors sloping in or along the outside of the building with the floors sloping out. Provide additional floor drains where either water is used or frequent wash down is expected. Provide hose bibs in shop areas suitable for various clean up activities. The recommended locations are one hose bib between every other stall to prevent hazards associated with long hose runs across stalls. All sinks must be deep, industrial quality, chemical resistant, and include sediment traps. The number of water closets, lavatories, urinals, etc. will be determined by the size of the facility and the maximum anticipated number of building occupants. Provide two chilled drinking water fountains, one in the shop and one in the customer waiting room (or classroom if combined).



Central Floor Drain

Connect All Drains to Oil and Water Separators

3-3.25 Compressed Air

Air compressors are used to power equipment, inflate tires and are also needed for cleaning equipment. Compressors should be large enough to service the entire facility, have automatic draining, a floor drain, and in humid areas have secondary drier. Locate air compressors within a mechanical room to help minimize noise levels. Air lines should be located on ceiling runs with overhead reel assemblies for customer convenience to prevent the tripping hazards of cables and hoses spread around the floor. Provide compressed air outlets to all stalls and other work areas utilizing compressed air powered equipment. Include moisture traps and regulators at each outlet. Outlets that hook up to portable equipment will have quick disconnects at the outlet. Comply with all OSHA requirements regarding hearing protection for loud machines and equipment.

3-3.26 Communications and Data

Provide at least one telephone and data outlet in the office, service desk, and the classroom. Include connections at the service desk for credit card sales connections. A public telephone shall be located in or adjacent to the service desk. Provide high speed

Internet connections for the office, customer waiting room, classroom, and at the service desk. Multiple computer terminal stations with data and high speed Internet connections are required at the service desk as determined by the program requirements for each facility. These terminals will be used to assist customers in obtaining information regarding parts, instructions, and research. For auto hobby shops with internal circulation, consider the need for a call station at the vehicle entrance.

3-3.27 Audio/Visual (A/V)

A centrally controlled public address (PA) system is required for the auto hobby shop. A speaker shall be provided for every 74.3 meters (800 feet) of net floor area and at least one public address speaker shall be provided in the customer waiting room, classroom, and office. Incorporate a public address (PA) capability with the phone system to allow paging from all staff phones, where possible. Refer to UFC 4-021-01, *Design and O&M: Mass Notification Systems* for additional information regarding public address systems. Provide televisions (TVs) located in the shop area and the customer waiting room as required by the program requirements. Strategically locate these TVs to accommodate the maximum amount of visibility throughout the shop with the least number of TVs. Include RG6 coax cable with cable or satellite TV services and electrical connections at each location.

3-3.28 Special Project Costs

Consider the following special factors when establishing initial estimates of project costs in addition to the usual cost estimating considerations:

- Consider using pre-engineered structures
- Where feasible, provide fencing in lieu of concrete masonry unit (CMU) for partitions
- Limit exhaust system to every other dedicated tune-up stall, recommend using an overhead system
- Where feasible, provide one compressed air service and hose bib per stall

CHAPTER 4

FUNCTIONAL AREA GUIDELINES

4-1 GENERAL

Chapter 4 presents criteria specifically applicable to the design of each functional area and space for arts and crafts centers and auto hobby shops. Primary design considerations are presented for each functional area indicating the anticipated use, performance, organization, character, and relationships between each area's component spaces. Specific criteria is provided concerning space sizes, critical dimensions, storage requirements, furnishings, equipment, and technical requirements for each component space within each functional area. The technical requirements provided in this chapter address only items with special criteria for each individual space. General design considerations are presented in Chapter 3.

The guidelines in this chapter apply to all sizes and classifications of facilities but some modifications may be required to suit the unique situation for the different classification and relationships of facilities. Specific space allocation guidance for prototypical facility sizes is presented in Chapter 2. All guidance is provided based on the recommended space sizes and capacities for each overall facility size, supplemented by standard use and size factors, as appropriate. These recommendations may be modified in the design of an individual project to reflect local program requirements and capacity needs.

4-2 ARTS AND CRAFTS CENTERS FUNCTIONAL AREAS

The major component spaces and functional areas to be considered during design of arts and crafts center facilities include the following:

- General Arts and Crafts Studio
- Woodworking Studio
- Framing Studio
- Computer Studio
- Graphics Studio
- Support Spaces
- Ceramics and Pottery Studio (installation specific)
- Photography Studio (installation specific)

The component spaces and functional areas described in this chapter include both core requirements and installation specific amenities. Core facility requirements and installation specific component spaces are identified in Section 2-2. The scope of operations and component spaces needed may vary depending upon installation specific facility requirements.

4-2.1 General Arts and Crafts Studio

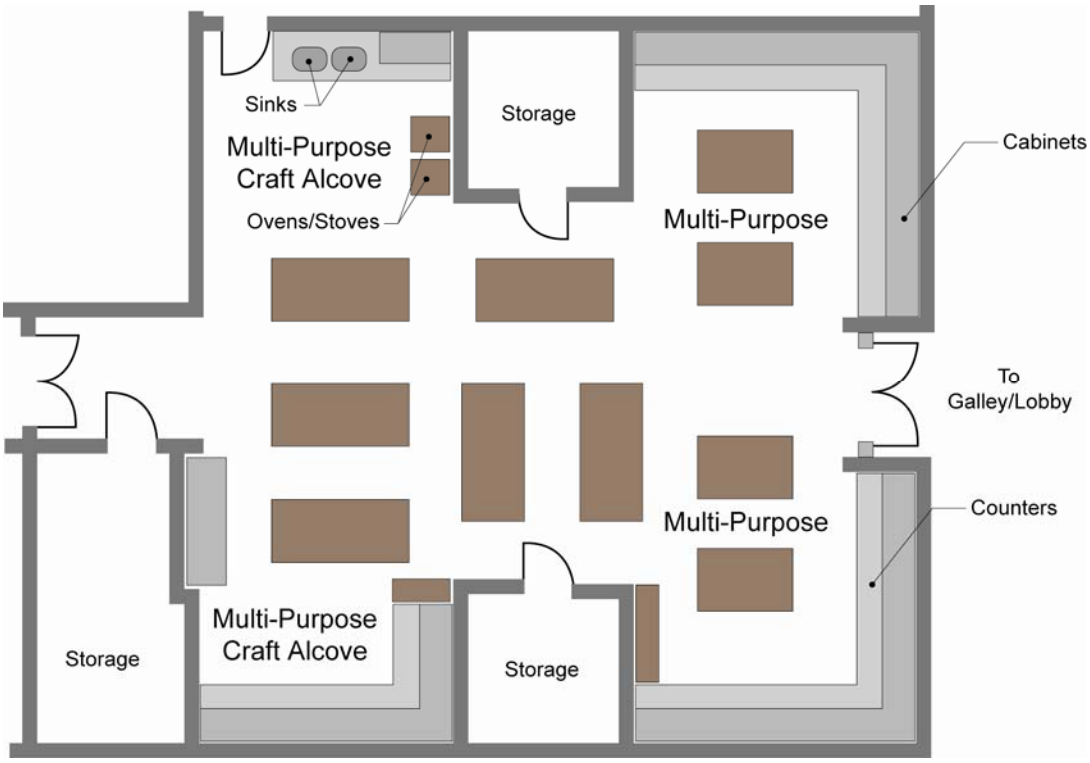
The general arts and crafts areas consist of the arts and crafts studio and various sized rooms for activities, projects, and storage of materials. The arts and crafts studio is primarily a multi-purpose space. A number of activities involve special techniques or equipment, which may influence the interior layout of a given alcove or its relationship to the larger workspace. The studio houses a broad range of activities commonly grouped together as “clean crafts” to distinguish them from ceramics or woodworking. Many of these crafts can be performed on a tabletop. Others require countertops, convenient electrical outlets, and adjustable task lighting. Still others need special equipment, such as easels, looms, and rock tumblers. In order for classes in different crafts to be conducted in the same space on the same day, flexibility must be built into the layout of this studio. An open space bordered by alcoves and storage cabinets is one recommended layout that can accommodate this multi-purpose function. The programs provided in the multi-purpose rooms of this studio are primarily clean crafts such as:

- Fabric and Needle Point
- 3-D Design
- 2-D Design
- Jewelry Making and Metal Art

General Arts and Crafts Studio Space

General Arts and Crafts Studio Space

4-2.1.1 **Figure: Example General Arts and Crafts Studio Floor Plan**



4-2.1.2 **Multi-Purpose Rooms and Alcoves**

General arts and crafts studios may contain a variety of multi-purpose rooms and spaces for activities like floral crafts, bookbinding, basketry, candle-making, puppetry, and cake decoration. Provide spaces that have the amenities needed to facilitate the unique program requirements of each facility. Consider the need for sinks, ovens, and other specialized equipment with unique plumbing or electrical requirements. If ovens or kitchen facilities are provided, ensure they meet requirements outlined in NFPA 96, *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations* and the 2001 US Food Code with 2003 supplement. The multi-purpose classroom described in Section 4-2.6.5 may also be used as a multi-purpose room to conduct general arts and crafts activities.

4-2.1.3 **Fabric and Needle Crafts**

Fabric and needle craft programs include sewing, weaving, tapestry, batik, tie-dye, macramé, knitting, stitchery, quilting, patchwork, and leatherwork. Most specialized equipment (table looms, rug looms, tapestry frames) is portable and easily stored. Foot powered looms and sewing machine tables require considerable floor space when in operation, but can be pushed together in an alcove when idle. Tie-dye, batik, and candle-making share a hot plate or stove, a sink, and a drying rack with catch basin.

4-2.1.4 **3-D Design**

3-D programs include sculpture, paper mache, and interior design. Sculpture may be done in any of the activity areas depending upon the medium (such as stone, modeling clay, wood, metal, paper, or cardboard). If stone carvings are to be offered, a folding

partition capable of completely closing off a portion of the multi-use space is required. This activity also requires outlets for power tools and water hook-ups for a grinding and buffing arbor.

4-2.1.5 2-D Design

2-D programs include drawing, painting, printmaking, etching, lithography, calligraphy, collage, decoupage, and brass rubbing. An open space for setting up portable easels is required.

4-2.1.6 Jewelry and Metal Art

This area includes jewelry design and fabrication, lapidary, rock polishing, enameling, and engraving. Requirements include electrical and compressed air outlets for power tools.

4-2.1.7 General Arts and Crafts Project Storage

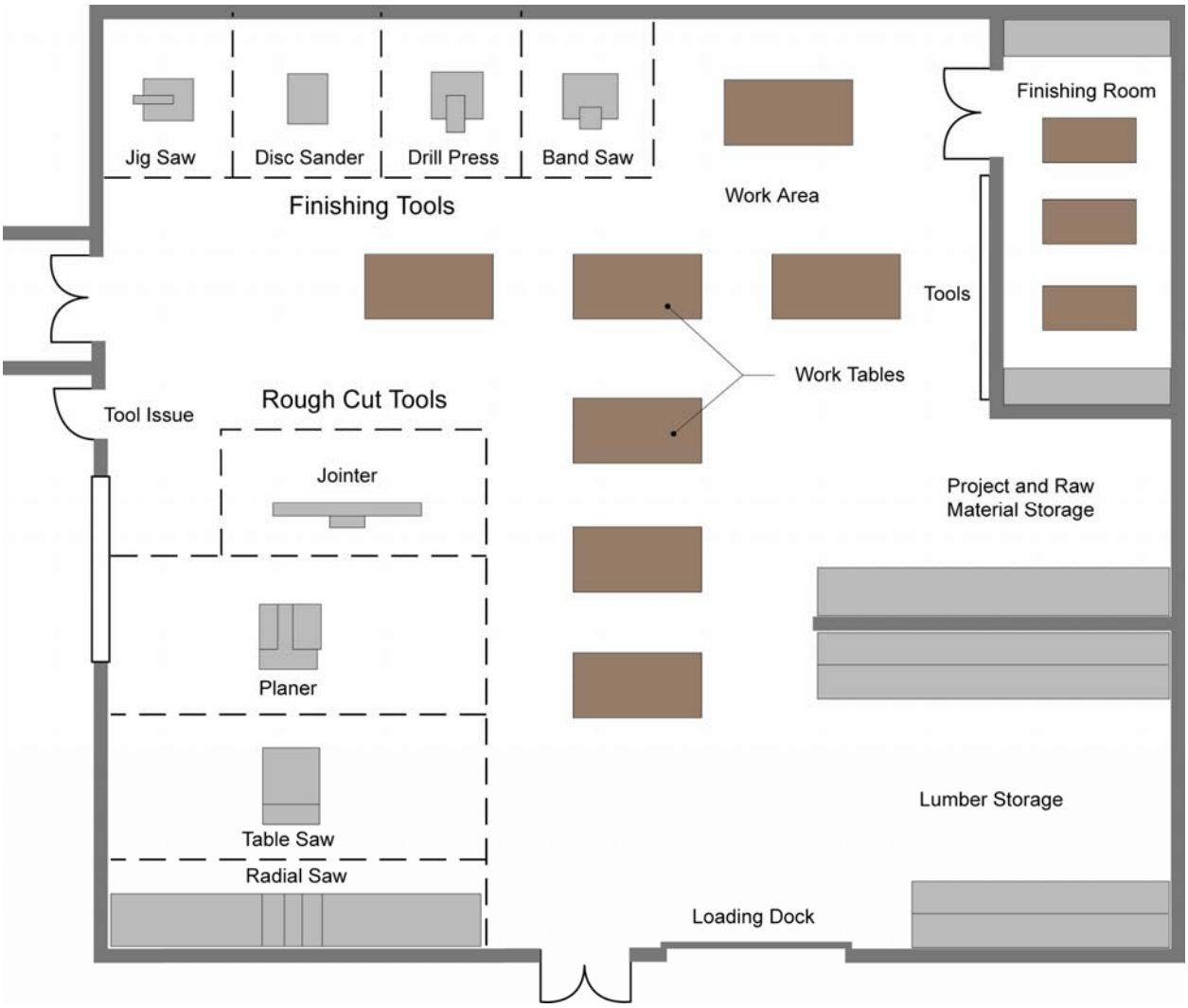
Adequate storage is vital to the efficient operation of an arts and crafts center. Storage space should not be sacrificed in the name of economy. Both general and specialized types of storage are required.

4-2.2 Woodworking Studio

The woodworking studio consists of the woodshop, tool issue room, lumber storage, project storage, finishing room, and optional commercial enterprises, such as a resale lumber room. This studio requires a loading dock as well as an outdoor, screened area for sawdust and trash collection. The tool issue room must adjoin the woodworking area in order to fulfill its two main functions: that of supervisor's office and that of depository for many dangerous hand tools. Figure 4-2.2.1 shows a typical plan for the woodworking area. Previous experience indicates that career military and retired personnel use the facility more often and attempt larger projects than do enlisted men or dependents. Although most participants work independently, the power equipment requires constant supervision and occasional assistance from a knowledgeable staff member. Examples of the types of projects and activities include:

- Small-scale carpentry
- Millwork
- Boat building
- Camper or van modification
- Upholstery
- Furniture repair/refinishing
- Sign making
- Cutting and adhering acrylic sheets
- Industrial arts construction in glass, wood, or plastic
- Classes and other instructional programs

4-2.2.1 **Figure: Example Woodworking Studio Floor Plan**



4-2.2.2 **Woodshop**

The woodworking shop shall be acoustically isolated from the rest of the building, in particular, from the classroom, general arts and crafts studio, library/lounge, gallery/lobby, sales store, and director's office. Should the woodshop and photo lab share a common partition, no vibration inducing power equipment, such as the radial arm saw, shall be mounted on the party wall. Access to an outdoor loading dock for receiving lumber and materials and removing large scale projects shall be through a metal rollaway service door. Where the climate permits, an adjacent, partially covered outdoor work area may be added to absorb overcrowding and to augment ventilation and illumination of the indoors. The dimensions of the shop room shall approximate a width-to-length ratio of between 1:1.5 and 1:2, with no obstructed floor width no less than 9.14 meters (30 feet). The minimum ceiling height (measured from the lowest point to presumably the lights) shall be 3.65 meters (12 feet). Aisles measured from the operational clearance lines and 1 meter (3 feet) out from the work tables, shall be at least 1.21 meters (4 feet) wide to permit two-way passage.

Typical Woodshop Layout

Typical Woodshop Layout

4-2.2.3 Woodshop Organization

The internal organization of the workshop shall allow the safe, functional operations of equipment and the smooth flow of materials and personnel. Most power tools will be fixed in position with operational clearances clearly demarcated on the floor with abrasive paint. Rough-cut tools, such as the radial saw, table saw, planer, and jointer shall be grouped separately from finishing tools, such as the band saw, disc and belt sanders, wood lathes, drill press, jig saw, and shaper. Positioning the work tables away from loud machines and near a wall with both a tacking surface for pinning up plans and pegboard surface for hanging tools is preferred. Alcoves or partitions may be employed to emphasize the functional separation between power equipment and handwork, and between cutting and assembly. A self-serve tool rack, securable by means of a rollaway grille or similar device, shall be easily accessible from the work tables and be in clear view of the tool issue room. Typically, this rack organizes assembly-type tools, such as clamps and vises, which are not dangerous to operate. Lockers approximately 300 x 300 x 450 mm (1 foot x 1 foot x 1 foot, 6 inches) deep and a drafting table may also be located in this area.

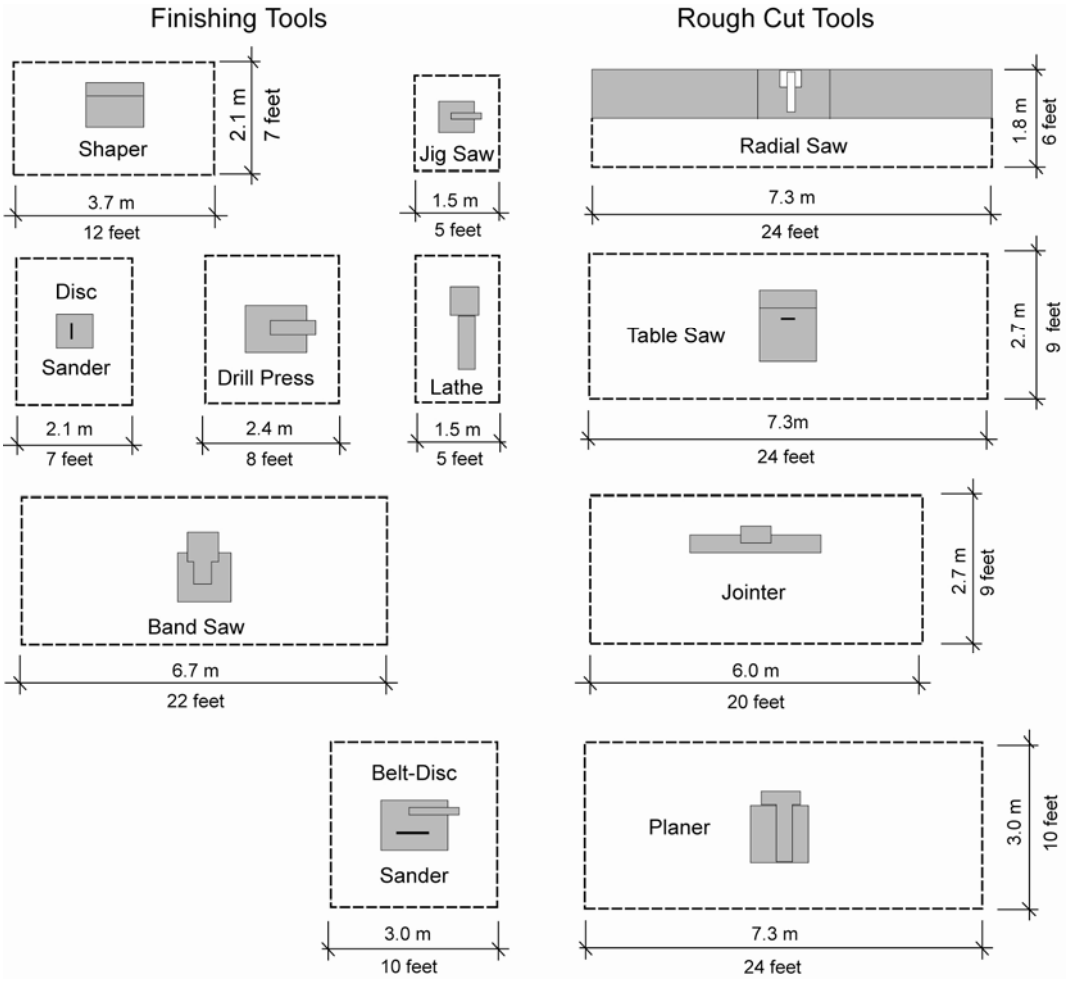
4-2.2.4 Woodshop Equipment

The woodshop is a large open space that contains fixed power equipment for cutting, shaping, and sanding. Workbenches are provided for the use of both handheld and portable power tools. The equipment and space must accommodate a variety of carpentry and cabinet-making activities. Shop equipment and material requirements include fixed power tools, hand tools, clamps, vises, workbenches, tool racks, storage cabinets, work sinks, tack-up surfaces, blackboard, and pegboards. Optional items include partitions, lockers, and drafting tables. Consider the need for an air compressor for pneumatic tools, such as nail guns and to aid in general cleanup. If utilized, air compressors must be located inside a mechanical room to prevent excessive noise within the woodshop. Core requirements for woodworking equipment are provided in Table 4-2.2.5.

4-2.2.5 Table: Core Woodworking Equipment Requirements

	Equipment Priority	Metric Area Requirement	Area Requirement (U.S.)
Table Saw	1st	7.3 m x 2.7 m	24 feet x 9 feet
Radial Saw	1st	7.3 m x 1.8 m	24 feet x 6 feet
Planer	1st	7.3 m x 3.0 m	24 feet x 10 feet
Jointer	1st	6.0 m x 2.7 m	20 feet x 9 feet
Belt / Disc Sander	2nd	3 m x 3 m	10 feet x 10 feet
Band Saw	2nd	6.7 m x 2.7 m	22 feet x 9 feet
Drill Press	3rd	2.7 m x 2.4 m	9 feet x 8 feet
Jig Saw	3rd	1.8 m x 1.5 m	6 feet x 5 feet
Wood Lathe	4th	2.7 m x 1.5 m	9 feet x 5 feet
Shaper	4th	3.7 m x 2.1 m	12 feet x 5 feet
Disc Sander	4th	2.7 m x 2.1 m	9 feet x 7 feet

4-2.2.6 Figure: Safety Markings for Fixed Power Tools



4-2.2.7 Woodshop Electrical Requirements

Explosive/dust-proof switches and light panels are required in the finish room and woodshop. Fixed power tools shall each have a safety cut off switch on the machine and circuit breaker in the main power panel at the supervisor's station. Grounded outlets shall be convenient to work tables and shall supply the maximum voltage anticipated for portable power tool use.

4-2.2.8 Finishing Room

This room provides a separate, dust free space for varnishing, staining, antiquing, painting, drying, and possibly, gluing. Due to environmental concerns, only brush application is permitted and spraying is not authorized. A self-contained, auto-type booth is recommended for paints, lacquers, and other coatings having hazardous fumes. Situating this room adjacent to an exterior wall will minimize the costs associated with special ventilation hoods, fans, and filters. This room must abut the building's perimeter wall so fumes can be directly vented to the outdoors. Since dust is the prime enemy of all finishing methods, steps shall be taken to locate this room well away from the fixed power equipment. Access to a paved outdoor space from this room is strongly recommended. Finishing and drying operations shall occupy opposite sides of the room. Partitions separating incompatible finishing activities, such as painting and varnishing, are also advised. If gluing is to be done in this room, a table specifically for this purpose shall be included. Include a two-basin sink, supply cabinet, work tables, drying rack, and ample storage space where projects may be left while drying. Consider an optional gluing table.

Finishing Room

Project and Raw Material Storage

4-2.2.9 Lumber and Raw Material Storage

This room is used to store dimensional lumber, rough timbers, plywood, acrylic sheets, metals, glass, and miscellaneous plastics. Space for separate shelving to hold resale lumber may also be required. The lumber storage room shall be located near the loading dock and the fixed power equipment and may include a service/receiving entry. Provide storage racks for lumber laid horizontally and sheets laid flat. Adequate clearance for maneuvering large unwieldy boards, especially 1.21 x 2.42 meter (4 x 8 foot) plywood panels, on to the storage racks is required. As the longest boards will measure 3.65 meters (12 feet), the lumber storage area shall be at least 4.26 meters (14 feet) long, with storage racks against the walls to organize various size boards,

assorted thicknesses of plywood, and metal, plastic, and glass sheets. Lockable double doors are advised to secure the room's contents and to ease the passage of 1.21 x 2.42 meter (4 x 8 foot) sheets of material.

4-2.2.10 Woodshop Project Storage

This area is used to store works-in-progress of various sizes, in various states of completion. Project storage shall be located near the work tables in the woodshop. Shelf space is required for stowing smaller pieces and component parts of larger projects. Floor area for freestanding, furniture-sized objects shall also be provided. Project storage space is included in the area for the woodshop. Include shelves and lockable cabinets or lockers. Shop-type fluorescent fixtures delivering 20-foot candles at floor level shall be installed in storage areas.

4-2.2.11 Woodworking Studio Materials and Finishes

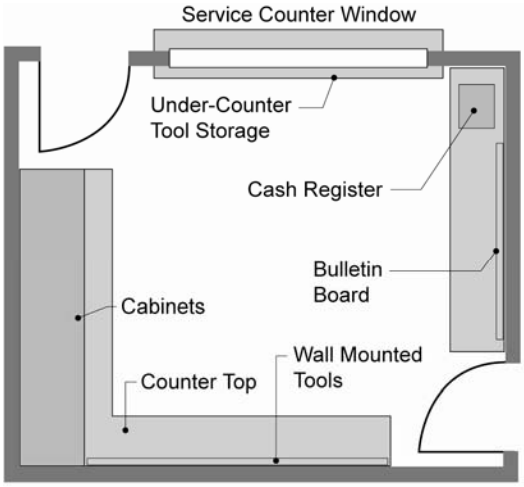
Sealed concrete or industrial wood block floors with a non-slip finish is recommended. Safety markings made with a brightly colored abrasive paint, typically safety yellow, shall indicate operational clearances around each fixed power tool. Walls should be constructed from a sound absorbent industrial material, such as masonry, with tack-up and pegboard surfaces provided near the workbenches. Any windows shall be clerestory height, except those in exterior doors, and all shall be glazed with wire glass. Exposed structural roof surfaces must be made sound absorbent. This can be done with acoustically rated panels, insulated roof decking, or other device. Controlled, natural day lighting by means of skylights is strongly encouraged for the woodshop area.

4-2.2.12 Tool Issue Office and Service Counter

The tool issue office shall have an unobstructed view of the woodshop. A second window into another space (the lobby, ceramics area, general arts and crafts area, etc.) will assist with monitoring from inside the other support spaces. Environmental separation, however, must be maintained. The staff member responsible for monitoring activities in the woodshop also runs the tool issue room where hazardous tools are kept. Participants "sign out" these tools based on evidence of proper experience and responsible use. The room shall provide securable storage as well as space for the shop supervisor's desk and filing cabinet. A wire glass opening adjacent to the entry door 1.21 meters (4 feet) square minimum shall be provided for surveillance. Surfaces shall be of a similar composition and construction as those in the woodshop. A pegboard for hanging tools, built-in shelving, bins for power tools, and a bulletin board for posting announcements and schedules shall be provided. Include accommodations for a cash register in the tool issue office and storage for smaller materials and tools for sale. Provide storage compartments below the service counter to maximize the storage potential of the space. Provide cabinets and counter space with electrical outlets for recharging battery powered tools.

Woodshop Tool Issue Office and Service Counter

Wall Mounted Tool Storage



Tool Issue Office Plan

Under-Counter Tool Storage

4-2.2.13 **Loading Area**

Provide a loading area with industrial roll-up or sliding doors near the woodshop lumber storage area that can also be used as the receiving area for the entire facility. Utilize factory finished doors that do not require painting. The color and material for doors should comply with the base facility excellence standards. Provide an asphalt or concrete access drive to the loading area that is a minimum of 3650 mm (12 feet) wide for access by large trucks. Consider the requirements for Federal Express, UPS, and deliveries of wood and lumber. Provide easy access to dumpsters or outside trash containers. Provide a doorbell or buzzer at the loading area door that can be heard in the woodshop, tool issue office, and the administration offices.

4-2.2.14 **Woodshop HVAC and Dust Removal**

Adequate ventilation, temperature, and relative humidity shall be maintained at a level to prevent surface oxidation of equipment and delamination or warpage of lumber. The ventilation system shall supply the required air change of 10 CFM per occupant, while allowing passage of the ducts used for sawdust removal. The finishing room shall be vented in accordance with OSHA requirements. A dust removal system for exhausting sawdust and vacuuming wood shards in the workshop is a necessary safety and maintenance feature. Two options are available:

1) Ducts can be permanently placed under access panels in the floor to reduce noise and visual obstructions.

2) Industrial rated, flexible duct connections can be installed overhead to simplify maintenance, reduce costs, and ensure a flexible equipment layout.

Utilize Dust Recovery Systems on Woodshop Equipment

Exterior Sawdust Collection System

In either case, all secondary runs must enter main ducts at acute angles, and each angular connection must have an opening for periodic clean out. Extra hook-up points shall be provided for future equipment needs and for use as a built-in vacuum cleaning system. Perimeter pipes, wall mounted 1.06 meters (3 feet, 6 inches) above the floor with quick connect fittings every 6 meters (20 feet) on center, make for a very functional system. Dust collection hoppers and fans shall be placed outside in a screened, paved area accessible by truck from the service drive. Larger facilities may opt for a single dust collection "dumpster arrangement," which will influence the configuration of the truck access drive.

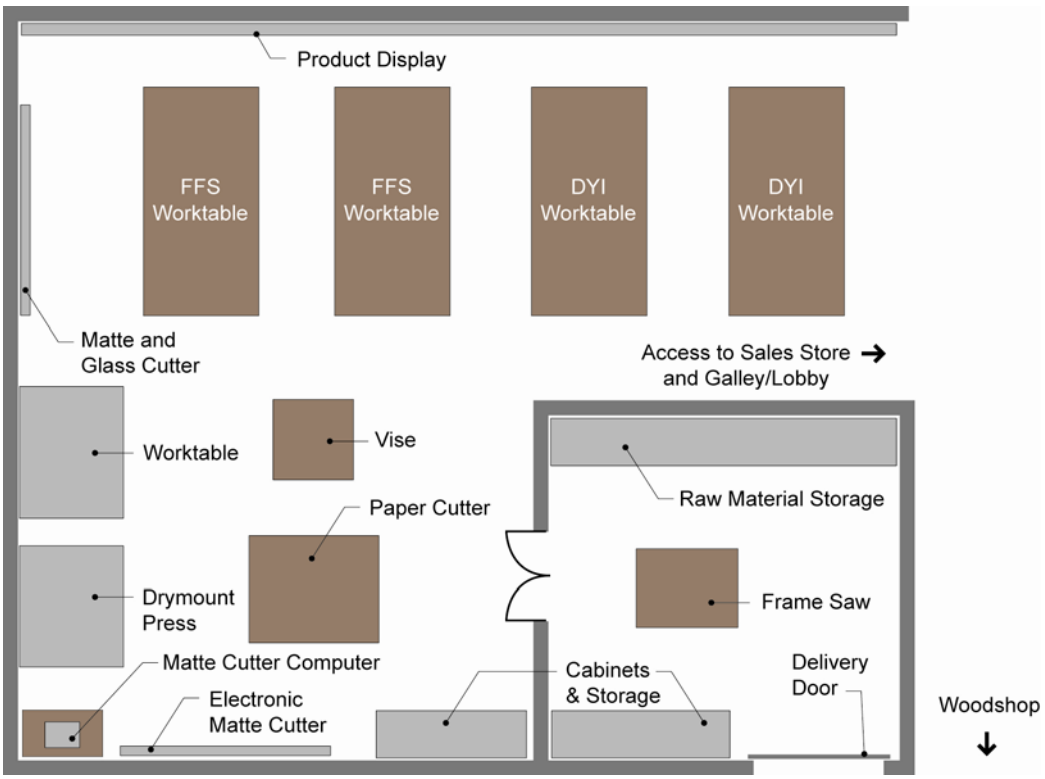
4-2.3 Framing Studio

The framing studio is an income generating service requiring special equipment for professional quality framing of photos, prints, artwork, and posters. Common practice is to restrict this activity to qualified staff and to perform all matting and framing on a "to order" basis. Framing activities may also be conducted by customers. Frame shop facilities shall accommodate both fee-for-service (FFS) and do-it-yourself (DIY) activities. The frame shop requires a humidity-controlled (40-50 percent relative humidity level) adjoining space for storage of molding as well as glass sheets, mat board, etc. All surfaces shall be durable and cleanable. In general, floors should be sealed concrete or resilient tile, walls should be painted masonry, and ceilings should be painted gypsum board.

Framing Studio

Electronic Matte Cutter

4-2.3.1 **Figure: Example Framing Studio Floor Plan**



4-2.3.2 **Sales Display Area**

One of the primary motivations of the centers is to make money to sustain operations. For this reason, space for a frame shop or other moneymaking ventures (if not allocated elsewhere in the facility) may be requested in this area. To reduce staffing, the frame shop may become part of the sales area or woodshop. The frame shop is best located near the woodshop so that auxiliary tools and lumber storage are convenient. Wall space is required to display frame options, materials, and samples. A larger operation can have an office space and sales counter near where sample frames are displayed.

4-2.3.3 Fee-For-Service Framing Area

Frame shop equipment requirements include a frame saw, vise, paper cutter, matte cutter, large worktable, dry mount press, and storage areas. Larger facilities may require duplicate equipment to accommodate both fee-for-service (FFS) and do-it-yourself (DIY) activities. Separate duplicate equipment to allow both FFS and DIY activities to be conducted simultaneously. DIY equipment may be used by staff members for FFS work during periods where there are no DIY customers. Some expensive and complex equipment, like an electronic mat cutter, will only be available for use by staff members due to the training and liability involved.

4-2.3.4 Do-It-Yourself Framing Area

The do-it-yourself (DIY) framing area should be collocated with the frame shop since some equipment may need to be shared depending upon the scale of the operation. Provide dedicated shelves and lockable cabinets or lockers for storage of customer owned materials and in-progress projects.

DYI Framing Area

DYI Framing Area

4-2.3.5 Raw Material Framing Storage

Inventory storage areas are required for long, uncut framing materials and large sheet products. Provide a dedicated room for this purpose in larger operations and consider locating these materials in an out of the way location within the frame shop for smaller facilities. Include shelves and lockable cabinets or lockers and a large roll-up door to facilitate delivery of materials. This area may also be used to store works-in-progress of various sizes and states of completion.

4-2.4 Computer Studio

Provide a dedicated room or space near the general or “clean crafts” studio for multiple computers for public use. Equipment requirements include electrical and data connections for computer workstations with high speed Internet service. Include supplementary equipment, such as printers, scanners, multimedia equipment, layout tables, storage cabinets, and counter workspace. Include adequate shelving for reference books and storage of software related items, such as manuals, boxes, and CDs. Provide plenty of lockable storage spaces for equipment, spare parts, and supplies.

Computer Studio

CD, DVD, and VHS Reproduction Equipment

4-2.4.1 **Computer Stations**

Provide computers for public use with local area network (LAN) connections to the base network and high-speed Internet service for online access to commercial, institutional, and government databases. The quantity of computer stations required will depend upon the program requirements at each facility. Include access to networked printers and scanners. Include plug-in stations for laptop computers.

4-2.4.2 **Printers and Copiers**

Provide space and equipment for copiers, laser printers, and color digital photo printers within the computer studio as determined by the program requirements. Include networked connections to the customer use computers as determined by the base Communications Squadron requirements. Provide space for trash and recycling containers adjacent to the printers and photocopiers.

4-2.4.3 **CD, DVD, and VHS Reproduction**

Provide space and equipment for compact disc (CD), digital versatile disc (DVD), and video home system (VHS) tape reproduction. Much of this equipment requires connections to computer stations and storage areas for materials and supplies. Include local area network (LAN) connections to the customer use computers and printers for output of labels, covers, and CD/DVD jewel case artwork.

4-2.4.4 **Computer Construction and Repair**

Provide workstations and layout tables for building and making repairs to computers. Include storage space for tools and spare parts. Consider the need for wall mounted peg boards to store tools, parts inventory, and accessories.

4-2.4.5 **Multimedia Classroom**

Consider the possibility of including all components of the computer studio in a classroom style configuration with workstations. Teaching graphics software classes and computer generated artwork techniques are a popular curriculum offering to arts and crafts centers that will likely continue to increase. Work tables, counter spaces, and cabinet or locker storage could be located along the edges of the room, with computer workstations and other equipment oriented in one direction for instructional “how to” classes and software demonstrations. Consider the need for a ceiling mounted

projector with a wall mounted, pull down projection screen or empty wall surface for training and computer demonstrations.

4-2.5 Graphics Studio

Graphics studio facilities shall accommodate both fee-for-service (FFS) and do-it-yourself (DIY) activities. Many of the activities in the graphics studio are income-generating services provided by staff members, such as awards, plaques, engraving, trophies, signs, and other graphic items. These items may be made on a "to order" basis by staff members or created by customers. The graphics studio is considered a "clean craft" and should be located adjacent to the computer studio since it may need to share some equipment, like computers and printers.

Graphics Studio

Graphics Studio Equipment

4-2.5.1 Awards, Recognition, and Graphics

Awards and recognition plaques are popular income generating offerings that may require a variety of equipment and materials from the graphics studio and possible other studio offerings at the facility. The equipment required will depend upon the program requirements at each facility and the design requirements for signs, displays, and other graphic elements.

4-2.5.2 Engraving

Computerized laser engraving equipment and automated routers should normally only be available for use by staff members to provide FFS products due to the training and liability involved. Many awards, recognition plaques, signs, displays, and other works of art require computerized engraving on wood, metal, plastic, or other substrates. Customers may develop digital artwork on their own in the computer studio and have the items engraved and produced in the graphics studio.

Computerized Engraving Equipment

Printing and Computer Equipment

4-2.5.3 **Printing**

Many different types of printing may be provided in the graphics studio. Color printers may be needed and shared with the computer and/or photography studios. New equipment and techniques for printing graphics on coffee mugs, tiles, glass, vinyl, and many other substrates are developed on an ongoing basis. Large format color plotters may be needed for printing signs, banners, and graphics on paper or vinyl. Consult with the facility director regarding the desired equipment and space needed for printing and graphic offerings.

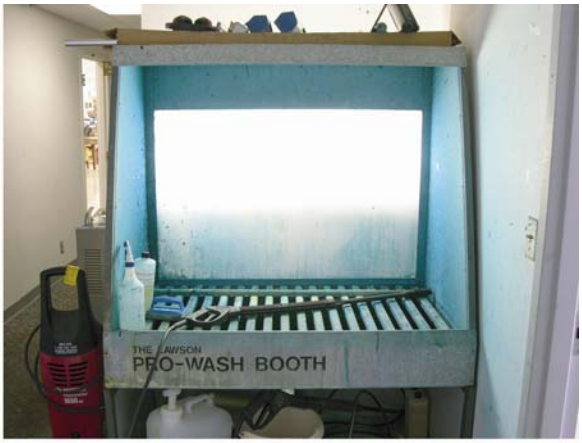
4-2.5.4 **Trophies**

Trophy fabrication will be an installation specific FFS and DIY offering depending upon the needs of each base. Woodwork for custom creations may be created in the woodshop and engraved metal plates created in the graphics studio. Include display areas for sample works, in-progress projects, and completed items waiting to be picked up. Provide catalogs and samples of component pieces that may be purchased from outside vendors, like cast figures or icons. The creation of trophies may require products and services from a variety of studios. Some portions of a project, like engraving, may need to be FFS, but other portions, like custom woodwork, may be created by customers.

4-2.5.5 **Silk Screening**

Silk screening activities are an installation specific offering that require special accommodations and equipment, such as a dark room for storing unexposed screens, racks for screen storage, a large sink for washing screens, a light box for exposing screens and other considerations. Toxic chemicals used in silk screening and etching must be stored in sealed containers inside a cabinet or disposed of in acid-resistant sinks. Due to the recent advancements in digital printing, many needs for traditional silk screen methods of printing can now be accomplished by using computers that are easier and more economical.

Silk Screen Area



Silk Screen Washing Station

4-2.6 **Support Spaces**

The sales store, entry vestibule or lobby and gallery, library/lounge, restrooms, administrative office, mechanical rooms, janitor's closets, and various storage spaces all represent support category spaces. These support spaces may also include internal circulation corridors and other common area spaces.

4-2.6.1 **Vestibules and Airlocks**

Provide a vestibule at the main customer entrance that consists of double sets of entrance doors at least 2 meters (6 feet) apart to create an airlock. Vestibules and airlocks are required as an energy saving measure. Specific designs and equipment may be needed based upon the climatic issues at each installation. Provide wheelchair accessible ramps and automatic doors according to the accessibility requirements identified in Section 2-1.6, *Accessibility*. Walk-off mats inside the airlock and removable rugs in lobby areas should be provided. Consider built-in drains inside recessed walk-off mats in foyers to allow water to drain off, and heated mats in cold weather climates. Provide adequate ventilation or climate control to prevent moisture accumulation or condensation. Provide signage at the front entrance that displays the arts and crafts center's hours of operation and FPCON status. Provide a trash container and ash receptacle outside of the building, near the entrance.

4-2.6.2 **Sales Store**

The sales store plays an essential role in the life of the arts and crafts center and may also be referred to as the service desk. Attractive spaces that resemble off base craft sales stores using professional fixtures and concepts are required to display merchandise to support classes, self-help, and custom work activities. The materials required for classes are supplied here, and the revenues generated do much to offset the cost of operating the facility. The store should open prominently onto the gallery/lobby not only to indicate its presence, but also to provide a surveillance post for the center. A 1.06 meter (3 feet, 6 inches) high partition with rollaway security grille is the preferred separation between the two spaces. This can maximize visibility from the sales counter, which must double as the reception desk. In addition to ringing up sales and watching over the center, the clerk stationed here typically greets visitors, hands out class schedules, registers new class members, and signs up those interested in special events. Provide accommodations for a cash register at the service desk and

staff seating behind the counter. The display area should have sufficient shelving to carry approximately 700 line items, such as paints, brushes, books, and tools.

Sales Store Service Desk

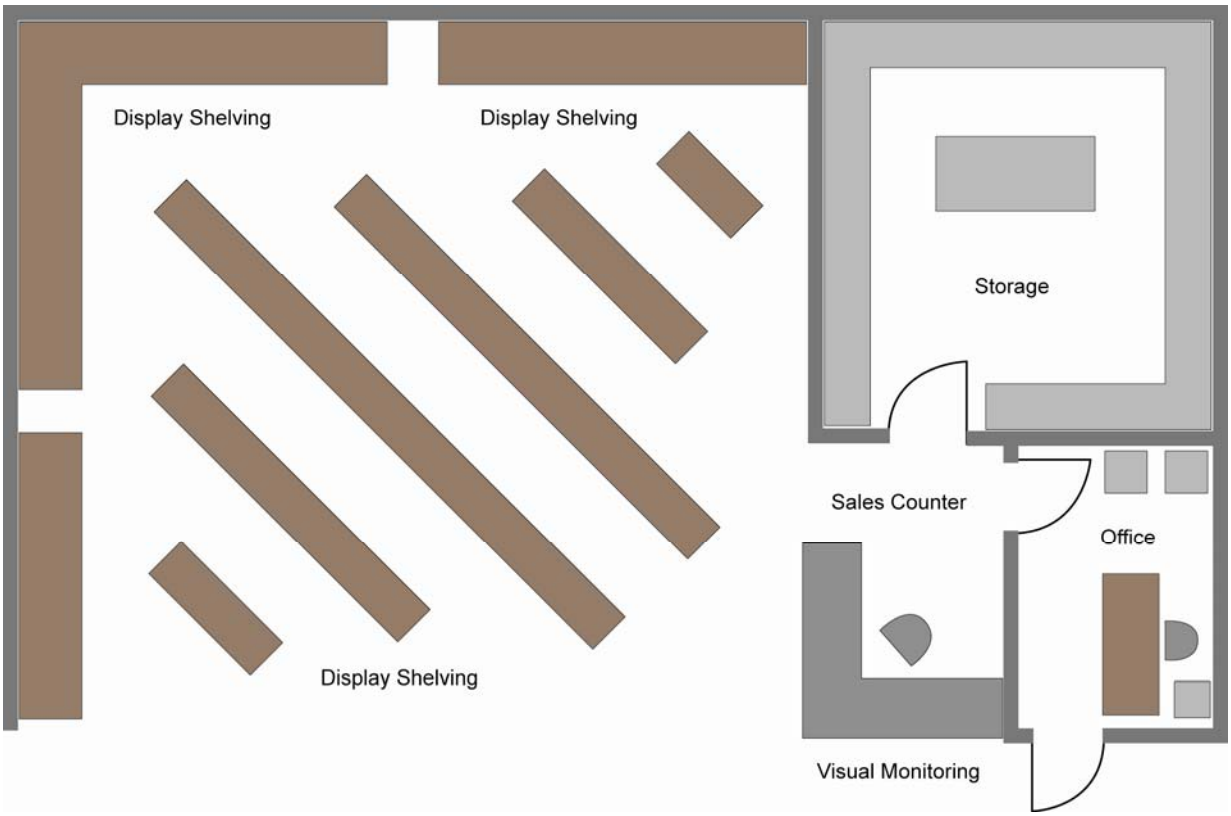
Sales Store Display Area

The store itself functions on a self-serve basis. Product displays should be constructed to enhance merchandising and ease inventory taking. In addition to tools and materials, the store may stock scale model kits, how-to books, hobby magazines, do-it-yourself frames, and any other items in demand. Other ventures may include renting equipment, collecting fees for classes or use of tools, and commissioning handcraft work for patrons (ceramics, woodwork, knitting, etc.). Associated enterprises requiring additional space include T-shirt iron-ons and printing, and trophy/plaque engraving. An attractive, maintainable floor covering, such as carpet or resilient tile, is advised. Walls may be painted or have a mirror finish to increase the sales appeal of merchandise. A tack-up surface mounted by the cash register station will allow posting of promotional material. Ceilings should be acoustically absorbent. A general illumination level of 50-foot candles shall be achieved in the store. Accent lighting may be achieved through use of track lighting or recessed “can” fixtures.

4-2.6.2.1 **Sales Storage**

A storage room of ample size is required for receiving, processing, and storage of sales stock. Storage space must be allocated to support back stock, factoring seasonal requirements, time of delivery, consignment merchandise, and volume of sales to determine space requirements.

4-2.6.3 **Figure: Example Sales Store Floor Plan**



4-2.6.4 **Lobby and Gallery**

This space provides participants with their first introduction to the building and acts as the core around which the main studios, sales store, and frame shop are distributed. As the primary public space and principal meeting spot, the lobby serves to orient visitors to the building, publicize activities and special events, and promote social interaction by providing an inviting and architecturally memorable spatial experience. The space also serves as an exhibit gallery to display participant's work. In this way, newcomers are encouraged to participate, while regular users are exposed to different activities in the building and given incentive to continue with their creative work. Subtly patterned carpet, colored in deep hues that hide stains, is the preferred floor covering for the seating area of the lobby. Perimeter areas require ceramic or glazed tile, or other stain resistant, easily maintainable surface.

Lobby and Gallery Area

Lobby and Gallery Area

Walls may be constructed of brick, stone, painted concrete, plaster, or gypsum board. The wall finish shall be off-white or another neutral color. A tackable wall band covered in carpeting makes for a very workable exhibit backdrop while offering a distinct acoustic advantage over hard surfaces. The ceiling shall be higher than in the rest of the public spaces to emphasize the importance of this area, but may be dropped as a perimeter bulkhead to support overhead track lighting or wall-wash fixtures. Track lighting shall be switched by rheostat control. Ceiling materials shall be acoustically absorbent. Devices for letting natural light into the space with an emphasis on controlling and diffusing it may include skylights, glass entryways, or clerestory windows. If windows or skylights are used, devices to protect the space from glare and to diffuse direct sunlight shall be installed. General artificial illumination shall be provided at 30-foot candles as measured 1 meter (3 feet) off the floor.

4-2.6.5 Multi-Purpose Classroom

The classroom services all functional areas and is used for a variety of purposes. Possible activities include movies, lectures, slide shows, and demonstrations. This space may also serve as a gallery or reception room during art shows or open houses, and as a portrait studio. The classroom shall be convenient to all activity areas, such as woodworking, ceramics, general arts and crafts, photography, and to the lobby for use as an exhibit or reception space. Typically, the classroom is adjacent to the general arts and crafts rooms and opens directly into the lobby and gallery area. The internal layout of the space shall resemble a classroom with a combination blackboard/tack surface/projection screen at one end and an optional projection booth at the other end.


Multi-Purpose Classroom


Multi-Purpose Classroom

A closet for storing tables, chairs, props, and equipment is needed to transform the classroom into a gallery or photo studio. Wall space shall not be cluttered. Windows, if any, shall be fitted with light tight shades to allow for daytime projection. In general, floors should be resilient tile or carpet, walls should be painted masonry or gypsum board, and ceilings should be acoustically absorbent. A continuous picture rail installed 2.28 meters (7 feet, 6 inches) above the floor is advised for hanging photo, painting, and drawing exhibits. A carpeted floor differentiates this space from studio workshops and contributes to a gallery atmosphere. Sinks are needed in the classroom to support the multi-crafts performed.

4-2.6.6 Administrative and Office Areas

Staff offices shall be located in the sales store area adjacent to the storage room. At least one office for the director of the arts and crafts center with the possibility of a second shared office for the other staff shall be provided. Provide a desk, chair, visitor's chair, file cabinets, shelving, storage space for carts, and a lockable door. Include computer network connections with Internet access and a telephone line. Consider the need for a conference table, sofa or love seat, and coffee or end tables with lamps. Floors shall be resilient tile or carpet, walls shall be painted or vinyl covered gypsum board, and ceilings shall be acoustically absorbent. General illumination shall measure 50-foot candles.

4-2.6.7 Restrooms

Provide centralized restrooms to serve all occupants of the center as well as the drop-in visitors to the sales store and the gallery/lobby. The restrooms shall be adjacent to the lobby and easily accessible from all activity areas. Provide separate male and female restrooms. In layout, choice, and position of fixtures, restrooms shall comply with federal standards for accessibility of people with disabilities in accordance with ADA and ABA requirements. Floors and wainscot shall be glazed or ceramic tile. Walls and ceilings shall be painted gypsum board, Portland and cement plaster, or high strength gypsum plaster.

4-2.6.8 Library/Lounge

The library/lounge provides a comfortable place to relax and socialize, to snack, and to browse through hobby magazines and "how to" manuals. In smaller facilities, these

activities will be recommended in the gallery/lobby, while reading materials will be kept at the sales store counter. As part of the central support core, the library/lounge shall be adjacent to the lobby and be accessible from all activity areas. Internally, the room shall be designed to accommodate lounge furniture, bookshelves, and two to four vending machines. Materials and finishes must be durable and cleanable to withstand food spills. In general, floors should be carpet or resilient tile, walls should be painted gypsum board or plaster, and ceilings should be acoustically absorbent. Reading lamps shall supplement the general illumination level of 30-foot candles.

4-2.6.9 Project Storage

Project storage should be supplied within each studio area as much as possible. Due to the extreme amount of storage needed throughout the entire facility, utilize support spaces, as required, to supplement storage opportunities, where possible. Storage closets should use shop-type fluorescent fixtures with daylight lamps delivering 20-foot candles at floor level.

4-2.6.10 Staff Break Area

Provide a staff break room adjacent to the administrative offices. Include a sink with hot and cold water, garbage disposal, soap dispenser, lockers, cabinet storage space, towel dispenser, task lighting over the counter, and counter space with electrical service for a coffee maker and microwave oven. Provide at least four GFCI electrical outlets at counter level. Provide space, electrical, and water service for a refrigerator with an automatic icemaker. Provide a table with matching chairs for meals and activities.

4-2.6.11 Vending Area

Address the need for snack or drink machines and other vendor-supplied equipment located inside the library/lounge. Locate vending machines in an alcove or recessed area with electrical connections, as required. Do not place vending machines near the entrance or in the gallery/lobby, when possible.

4-2.7 Ceramics and Pottery Studio

The ceramics and pottery studio is an installation specific offering that consists of an open studio area, supply storage, project storage, a dirty room, and the kiln room. The ceramics studio should be a large open space bordered by alcoves for hand modeling, mold pouring, and throwing on the potter's wheel. This area requires a black board for classroom instruction. An adjoining alcove with counter space for glazing and decorating fire objects should also be provided. Additional activities that may be included in this area include mosaic design and assembly, and tile making. The ceramics and pottery are considered "dirty" crafts because of the messy nature of the work. The studio shall be in a self-contained space, environmentally isolated from the rest of the building, and separated from the woodworking area in particular. In moderate climates, an outside covered work space may be added, particularly if a gas-fired or raku kiln is to be installed.

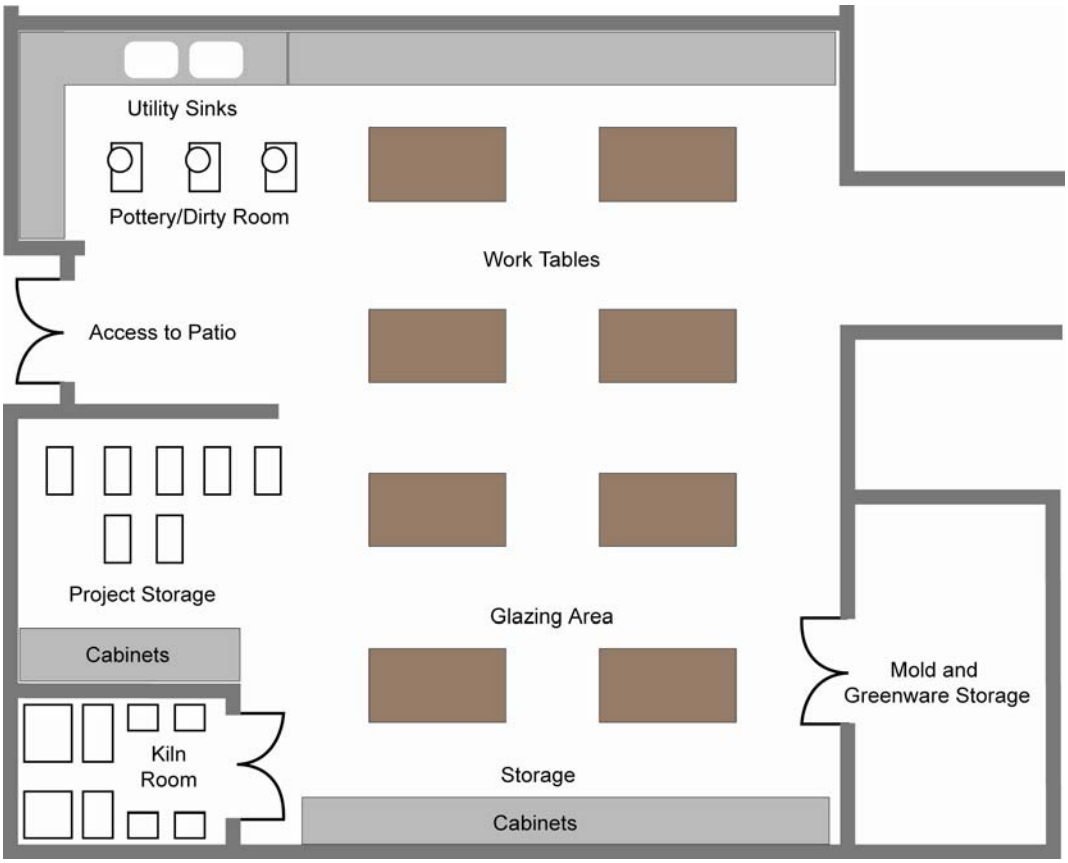
Ceramics Studio

Mold Storage Room

The internal layout should be comprised of an open space served by smaller component spaces, which can be articulated by furniture, equipment placement, and/or partitions of the solid or folding variety. Work tables should be centrally located to compliment the activities in the classroom area, the pottery wheel area, and the glazing area. However, certain activities may indicate that these tables be stowed temporarily in a side alcove. The overall layout should reflect a logical progression of events in the ceramics studio. In general, the unmixed clay travels from supply storage to the "dirty room" for preparation, to the work tables or pottery wheels for hand building, mold pouring, or throwing, to project storage for curing, to the kiln for firing, to the glaze area for decorating and finishing, to the kiln for final firing, and back to project storage to be claimed by the artisan.

Casting slip-in, factory-made, plaster molds is often the most popular, and from a business standpoint, the most profitable activity in the studio. While some initial instruction is required, posted directions and the advice of more experienced classmates will suffice for the average participant. Hand modeling and wheel throwing, on the other hand, are acquired skills. Only experienced participants familiar with proper techniques and procedures will be able to work independently. All clay work, especially mold curing, will produce high levels of humidity, which must be confined to the ceramics studio. Slip casting activities should take place in the ceramics and pottery studio area because similar facilities are required for these activities.

4-2.7.1 **Figure: Example Ceramics and Pottery Studio Floor Plan**



4-2.7.2 **Dirty Room**

Consider an optional fully tiled “dirty room” equipped with a large sink and hose bib or handheld showerhead that is useful for mixing clays and washing down tools and equipment. The room may also contain pottery wheels and tables for mold pouring along with related equipment. Provide a floor drain to help facilitate cleaning.

4-2.7.3 **Kiln Room**

This room houses electric kilns, cooling racks, and shelving for kiln furniture. Common practice is to restrict user access to this space and perform firing as a paid service. Efficient layouts provide room for the rapid loading and unloading of the moveable project storage racks. The kiln room shall be situated at or near an outside wall so as to eliminate or at least minimize exhaust system ducting. If a gas-fired kiln is to be included, a found-type space separated from the rest of the building by a 3-hour fire-rated wall is required. This type of space is the logical place for glassblowing furnaces and molten metal equipment. In hot/dry and warm/humid climates, these specialized activities are better accommodated outdoors due to the excessive heat and fumes they generate. The materials and method of construction specified for the kiln room shall provide 3-hour fire-rated protection. No kiln shall be installed closer than 600 mm (2 feet) to any wall or partition. Fire alarms and extinguishers shall be provided for emergency suppression of fire. Refer to AFI 48-145, *Occupational Health Program* for additional requirements and considerations.

4-2.7.4 Mold Storage Room

Ceramics materials, tools, and molds are generally stored in one or more lockable rooms and dispensed to users through a door or window opening in the wall. A menu board with pictures of numerous molds and a listing of tool and material prices should be prominently displayed outside. An alternative arrangement is to sell slip, clay, and other materials at the sales store. Molds are then provided on a supervised, self-serve basis to those participants who have purchased the "approved" slip from the store. This approach eliminates "nuisance fees" for renting molds, and more income is generated with less demand on the staff. Either arrangement requires mold storage space with sufficient shelving to hold 500 or more molds, each measuring and average of 300 mm (1 foot) high, 300 mm (1 foot) wide, 150 mm (6 inches) thick.

4-2.7.5 Greenware Storage

Greenware materials are often packaged in large containers, therefore, supply storage shall have ready access to a service entrance. Storage for molds and materials should be located near the kiln room to utilize kiln heat to dry molds.

4-2.7.6 Glazing Area

A glazing area is required for applying decoration and glaze coatings prior to the final firing of a piece. Due to environmental concerns, spraying utilizing an electric air compressor is no longer authorized and only brush applied finishing is permitted. Locate the glazing area near the kiln room to minimize the distance required to carry unfinished works to the kiln for final firing.

4-2.7.7 Project Storage

Moveable racks are required to help the staff move greenware to the kilns and return fired bisque-ware to their makers for glazing. These mobile shelves must carry a minimum of 400 pieces, each measuring 200 mm (8 inches) high, 200 mm (8 inches) long, and 100 mm (4 inches) thick. In larger facilities, these racks will occupy a separate room accessible to users. In smaller centers, the bisque-ware laden racks will be parked in an alcove where participants can easily claim their pieces.

4-2.7.8 Ceramics Areas Materials and Finishes

All room finishes shall be non-porous, cleanable, and durable. In general, floors should be sealed concrete, walls should be painted masonry, and ceilings should be painted gypsum board. Broad expanses of glass are discouraged, as they tend to attract ceramic dust and are difficult to clean. Wall and floor surfaces in the "dirty room" shall be glazed tile.

4-2.7.9 Ceramics and Pottery Studio Lighting

Illumination shall be uniformly distributed in the studio space at a minimum level of 50-foot candles measured 1 meter (3 feet) above the floor. This shall be accomplished by use of color-balance fluorescent fixtures. Adjustable task lighting fixtures mounted along counters in the craft alcoves are required, especially in the glazing area, to raise light levels to 80 to 100-foot candles, depending on the work performed. Shop-type fluorescent fixtures with daylight lamps delivering 20-foot candles at floor level shall be installed in project storage areas.

4-2.7.10 Ceramics and Pottery Studio HVAC

A separate exhaust system to vent the heat and fumes from the kiln room is required and shall be controlled from within that space. In order to reduce caked-on clay, moisture, and mildew, both a dust removal and high capacity dehumidifier system are required in the studio.

4-2.7.11 Ceramics and Pottery Studio Electrical

A supply of 220-240 volt outlets for electric kilns is required. 110-120 volt floor mounted convenience outlets are required for potter's wheels and portable equipment. Wall-mounted GFCI outlets shall also be provided at perimeter work areas 150 mm (6 inches) above counter height, 1.2 meters (4 feet) on center.

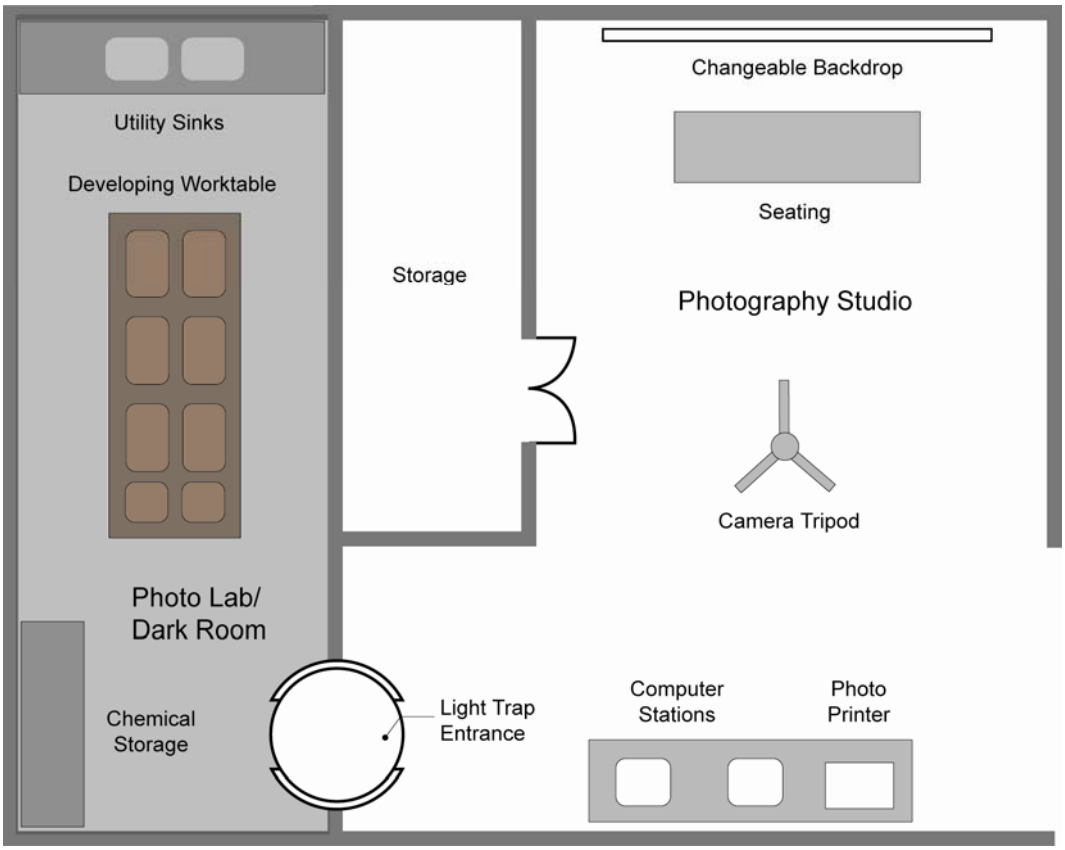
4-2.7.12 Ceramics and Pottery Studio Plumbing

Work sinks must have sediment traps and be positioned near the glazing area, kiln room, and in the general work area. The "dirty room" shall have a hose bib and floor drains with sediment traps. Floor drains in the work area for periodic wash downs are also advised. Provide hot and cold water for the dirty room and glazing area.

4-2.8 Photography Studio

The photography studio is an installation specific program. The photography related offerings may consist of photography labs, developing rooms, adjacent finishing area, and storage. The photo lab and finishing area shall be adjacent to one another and in close proximity to the support services classroom, which may alternately serve as a portrait studio, demonstration and instruction space, and a gallery. The photography studio consists of a light tight photographic lab for enlarging, a finish room for drying and mounting prints, one or more film loading booths, and a chemical storage area. If both black and white and color work are in demand, then the lab shall be subdivided in separate areas due to the need for total darkness during the color enlarging process. Each type of darkroom, however, shares the need for a wet area with sink and trays for print processing and a dry area for enlarging. Certain facilities require additional space for a photo studio, where backdrops and light stands are made available on a fee basis for portrait work, like family or group photos, passport photos, glamour shots, and dress-up specialty photos. When utilized, the photography studio usually adjoins this general arts and crafts studio and represents a special case where a unique design is required to support a single craft. Photo quality printers may be located in the graphics studio where customers may output digital photography and manipulate the photos using desktop publishing software.

4-2.8.1 **Figure: Example Photography Studio Floor Plan**



4-2.8.2 **Photo Lab/Dark Room**

A light trap entrance to the photo lab, preferably a door or a maze, shall be provided. The internal layout of the lab shall allow the different activities associated with film processing and printing to occur simultaneously. In no case shall vibration-causing equipment, such as ventilators or woodworking equipment, be mounted near or against walls adjoining the photo lab. Film loading cubicles require total darkness so their doors must be fully "weather stripped" against visible light. These small closet spaces typically open onto an area in the finishing room near a sink, chemical storage, and film drying equipment. In smaller labs, a film loading cubicle will double as a film development/chemical storage room. The finishing room area shall share space with graphic arts activities in the general arts and crafts area, or be a distinct room.

Counter space for cropping, mounting, and matting shall be provided with locking cabinets below for storage. A minimum clearance of 1 meter (3 feet) in front of enlargers and film developing counters is required. A 1.2-meter (4 foot) clear width is needed where people must pass, and is the minimum separation required between the enlarger area and the processing trays in the wet area. Although space in a dark room is limited, crossing or converging workflow must be avoided, particularly in color classrooms where harmful chemicals are used. Non-porous, durable, chemical resistant, and cleanable surfaces are required throughout. For example, floors should be sealed concrete or resilient tile, walls should be painted masonry or gypsum board, and ceilings should be painted gypsum board or plaster.

4-2.8.3 Photo Lab Environmental Controls

Photo lab(s) shall be light tight and painted flat black. While black and white dark rooms may use sodium vapor safe lights (these may require baffles or additional filters), color film processing requires total darkness. Key operated auxiliary lighting shall be provided in dark rooms for cleaning and teaching purposes. Fluorescent lights shall not be used in dark room areas as the afterglow of the tubes may affect the undeveloped film or print paper. The finish area requires 50-foot candles of light measured 1 meter (3 feet) above the floor, which shall be provided by color-balanced fluorescent fixtures. Task fixtures are advised for the matting/cropping area. Photo work is done in an enclosed room, therefore air handling systems must maintain constant temperature and humidity levels. A minimum air change rate of 5 CFM per occupant is advised for fume control, and dust elimination filters are required. Provide outlets for enlargers, timers, safe lights, and other lab equipment, preferably mounted 1'-0" above counter height in a continuous strip. Print dryers and dry-mounting presses shall each be on separate circuits. The ability to control water temperature is extremely important in the developing process. A mixing spout fixture with built-in temperature gauge is therefore advised. In some areas, charcoal filters must be installed in faucets to remove mineral deposits in the water. Pipes and sinks shall be corrosion resistant. A holding tank for dispensing photochemical waste is required. Access to the tank for waste removal and silver retrieval shall be provided.

4-2.8.4 Photography Chemical Storage

Provide a lockable, fireproof metal cabinet to store photography chemicals and other hazardous materials with a Class A fire extinguisher mounted directly adjacent. Locate chemical storage cabinets inside the photo lab and away from customers in the photography studio.

4-3 AUTO HOBBY SHOP FUNCTIONAL AREAS

This section of Chapter 4 presents criteria applicable specifically to the design of each functional area and space of the auto hobby shop. For each functional area, primary design considerations indicate the anticipated use and performance, organization and character, and component space relationships. Then, for each space included within the functional area, specific criteria are provided concerning space size and critical dimensions, storage requirements, furnishings and equipment, and technical requirements. The technical requirements address only items with special criteria for the individual space; otherwise apply general considerations presented in Chapter 3. The major functional areas to be considered during the design of auto hobby shops include the following:

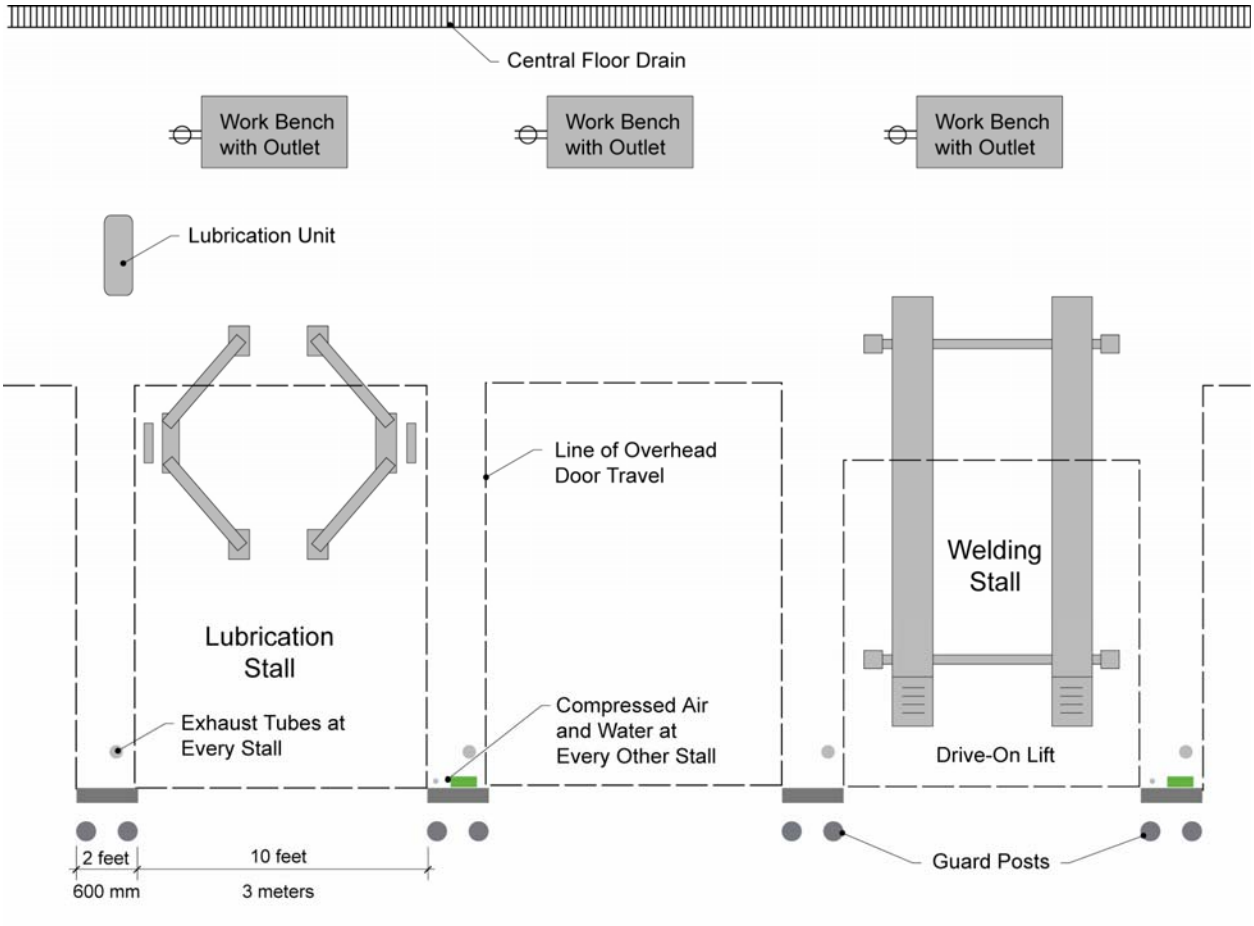
- Dedicated Stalls
- General Stalls
- Stall Support
- Shop Areas
- General Support Areas
- Administration
- Car Wash

The component spaces and functional areas described in this chapter include both core requirements and installation specific amenities. Core facility requirements and installation specific component spaces are identified in Section 2-3. The scope of operations and component spaces needed may vary depending upon installation specific facility requirements.

4-3.1 Dedicated Stalls

Dedicated stalls require specialized equipment and layouts that include front end alignment, tire mounting and wheel balancing, muffler and exhaust, lubrication, steam cleaning, wash racks, sand blasting, and large vehicle repair. Specialized or heavy equipment, like alignment machines, hydraulic lifts, and welding equipment, are permanently located at these stalls since it is not practical or cost effective to duplicate these offerings in multiple areas. Consider the need to locate some dedicated stalls together in a central area since most FFS activities will be provided in dedicated stalls. Diagnostic and other equipment that will be utilized only by staff members providing FFS work should also be located within the dedicated stall areas.

4-3.1.1 Figure: Example Dedicated Stalls Floor Plan



4-3.1.2 Front End Alignment Stalls

Front end alignment requires the use of very expensive specialized equipment. Due to the specialized training and liability involved, only trained staff members may perform front end alignment work. This fee-for-service (FFS) work is a primary income generating activity for an auto hobby shop.

Front End Alignment Stall and Equipment

Front End Alignment Equipment

4-3.1.3 Lubrication Stalls

Hydraulic lifts are required for lubrication stalls to elevate vehicles to the height desired for access to the underside of vehicles. Locate support equipment, such as grease guns and other specialized equipment, adjacent to the lubrication stalls. Outdoor lubrication pits are prohibited due to the potential environmental impact of oil leaking into the ground.

Lubrication Stalls

New Outdoor Lubrication Pits are Prohibited

4-3.1.4 Muffler, Exhaust, and Tire Stalls

Hydraulic lifts are required for working on mufflers, exhausts, and tires to elevate vehicles to the height desired for the work being performed. Locate tire mounting and wheel balancing equipment adjacent to tire stalls.

Muffler and Tire Stalls

Drive-On Lift Equipment

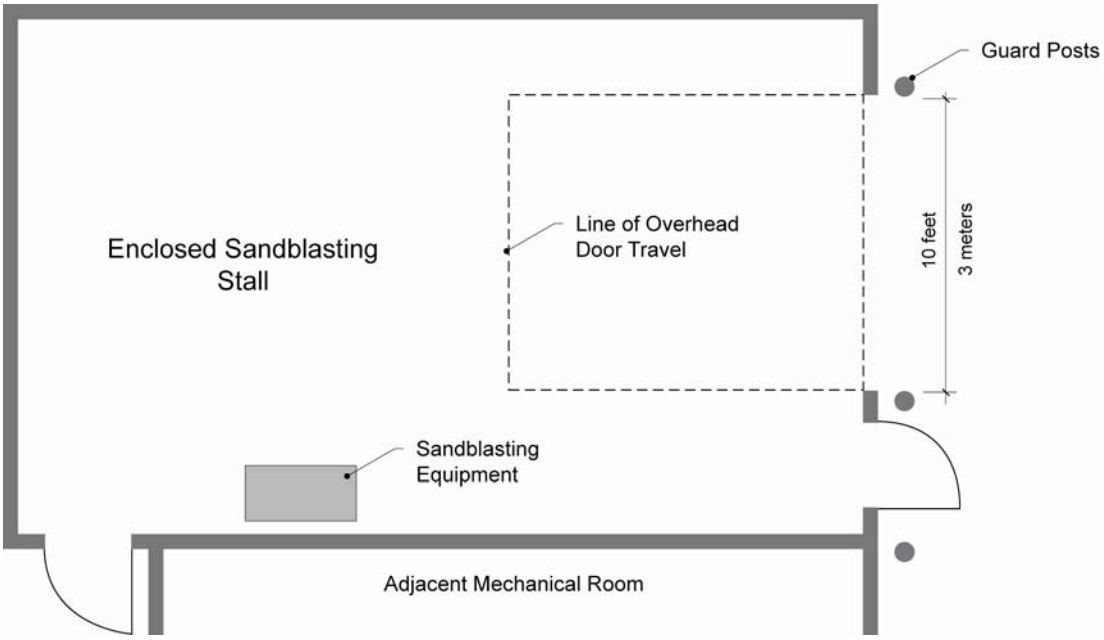
4-3.1.5 Large Vehicle Repair Stalls

Consider the need for large vehicle repair stalls to service recreational vehicles (RVs), buses, trucks, large vans, etc. These installation specific stalls may be required for fleet maintenance as well as fee-for-service and self-help activities. Consider the need for specialized lift equipment for large vehicles. Ensure overhead doors and clearances are adequate for the anticipated vehicles to be accommodated.

4-3.1.6 Sandblasting

Sandblasting is an installation specific service that requires specialized equipment. Special enclosed stalls for sandblasting should be located near the mechanical room in close proximity to the air compressors.

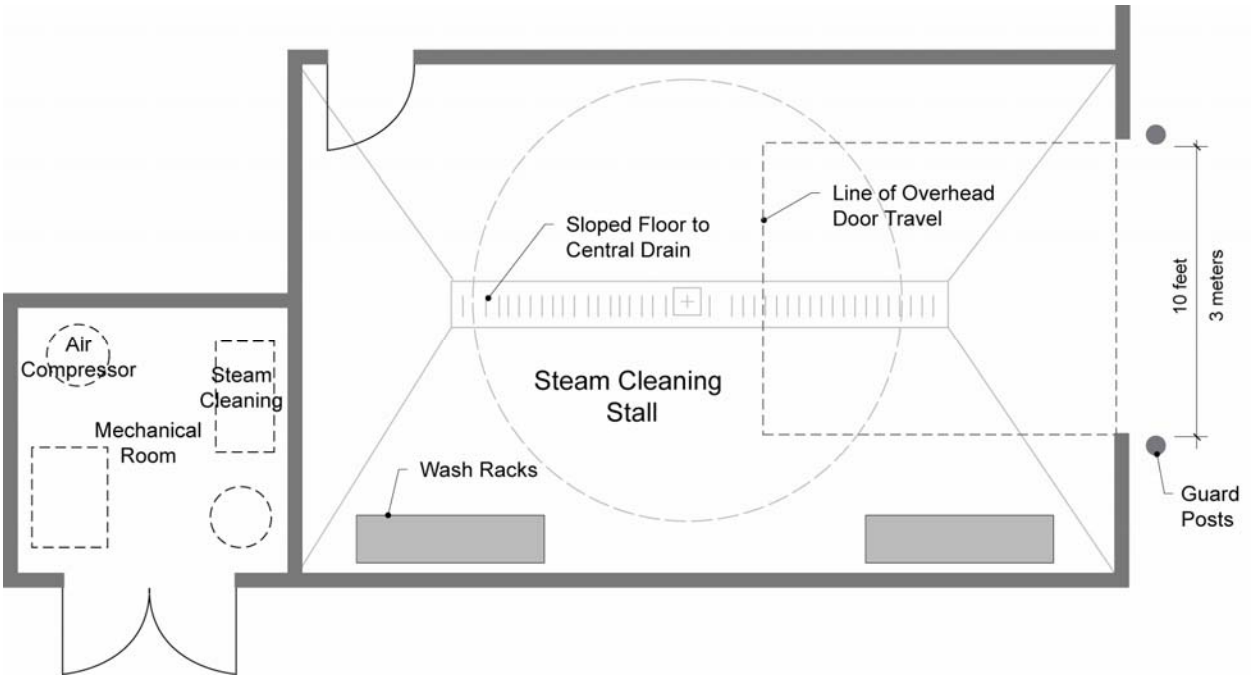
4-3.1.7 Figure: Example Sandblasting Stall Floor Plan



4-3.1.8 Steam Cleaning and Wash Racks

Steam cleaning is an installation specific service that requires specialized equipment. If utilized, locate the steam cleaning bay or stall near the engine storage area and the engine repair stalls. Locate this bay or stall adjacent to the mechanical room so that steam generation equipment can be physically separated for safety and noise control. Provide open grate floor drains down the center of the steam cleaning bay with floors sloped to the center to collect runoff that must be connected to an oil and water separator before being discharged from the facility.

4-3.1.8.1 **Figure: Example Steam and Wash Stall Floor Plan**



4-3.2 General Repair and Tune-up Stalls

General stalls are utilized for general repair and maintenance like tune-ups, engine repairs, oil changes, installing stereos, body work, and other activities that do not require specialized or heavy equipment. Provide a hose bib and compressed air hose between every other general stall. Provide a minimum of two 4-post stalls.

General Repair and Tune-up Stalls

General Repair and Tune-up Stalls

4-3.2.1 Outdoor Stalls

Provide outdoor stalls to supplement general indoor stalls where permitted by available space and climatic conditions. Consider the need for overhead shade structures covering outdoor stall areas to maximize the usefulness of these areas. Provide drive-on ramps, compressed air, water, cleaning equipment, and other stall support amenities required for general stalls to satisfy customer needs.

Outdoor General Repair and Tune-up Stalls

Engine Repair Stalls Require Specialized Equipment

4-3.2.2 Engine Repair Stalls and Work Areas

These stalls have the same requirements as general repair stalls, but also need access to specialized hoists for lifting engines. Locate these stalls near the engine storage room and steam cleaning bay. Include access to engine stands. Provide work stations for working on engines that have been removed from vehicles.

4-3.3 Stall Support

Stall support areas should provide space for clean up equipment, work benches, and circulation. Work benches that are equipped with a vise, electrical outlets, jack stands, and clean up equipment are required for each stall. Tools and specialty equipment will be checked out from the service desk on an “as needed” basis for inventory control. Support areas near the work bench for each stall should include a mop and bucket on rollers for clean up. Provide an industrial-type sink with soap dispenser for clean up in the shop area that is centrally located for all stalls. Equipment needed includes rolling carts for engines, transmission jacks, and other miscellaneous equipment. Locate OSHA approved emergency eye wash stations and decontamination showers, as required, throughout the facility and near hazardous areas, like the battery charging room and machine shop.

Stall Support Work Bench

Engine and Parts Storage Area

4-3.3.1 Engine and Parts Storage

Provide a storage area for engines and other parts that are in the process of repairs. Locate these areas adjacent to the engine repair stalls and work areas to minimize the distance required to move heavy engines. Consider the need for an enclosed room or chain link fencing to secure items in storage. Locate storage areas where they do not interfere with other activities since engines and parts may need to be stored for extended periods of time.

4-3.3.2 Battery Charging Room

Provide an enclosed battery charging room with a separate ventilation and exhaust system to remove fumes. Include storage for portable battery charging stations. Locate an OSHA approved emergency eye wash station and decontamination shower inside the battery charging room or immediately outside the door.

4-3.3.3 Long Term Vehicle Storage

Provide a storage area for vehicles that need repairs or are in the process of being repaired. The vehicle storage area may be located outside the building and should be enclosed with a fence for security. Locate the storage area within easy access to the shop areas and where disabled vehicles will not interfere with the normal shop activities.

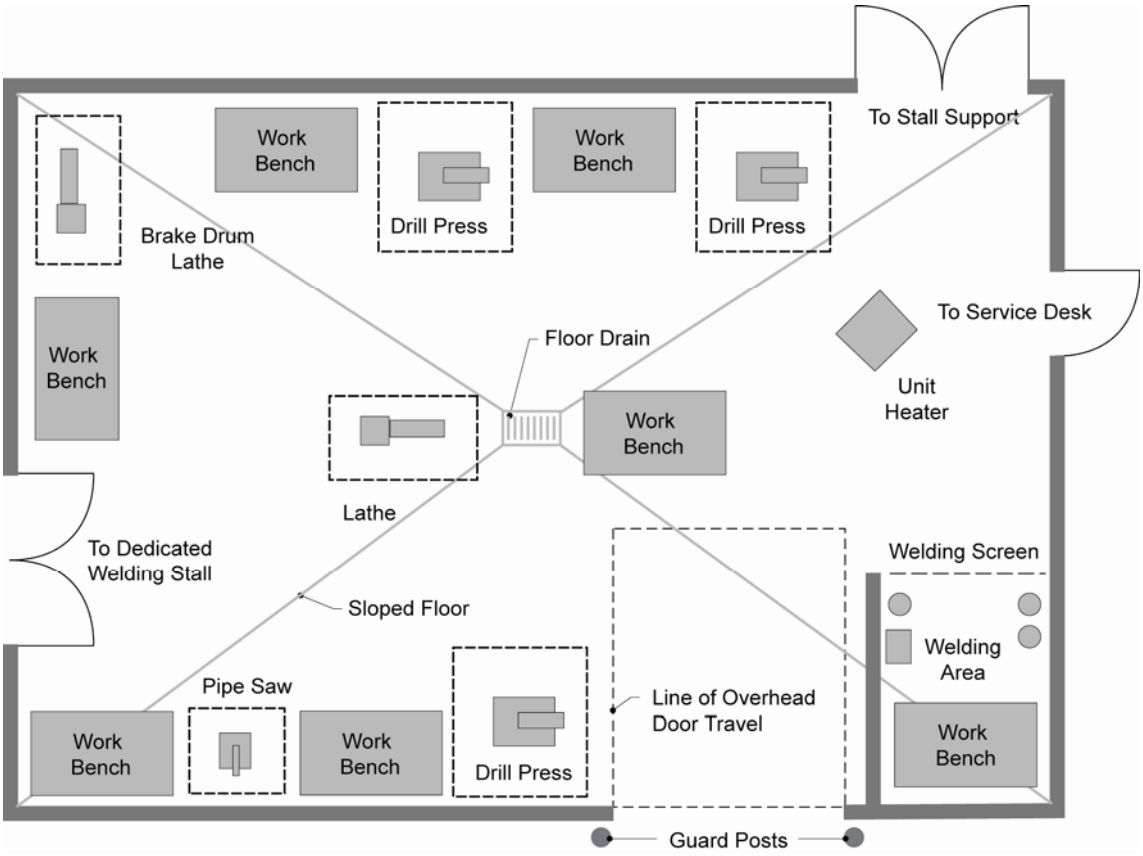
Long Term Vehicle Storage

Machine Shop

4-3.4 Machine Shop

The machine shop must have direct vehicle access. Required equipment includes a brake drum lathe, drill press, pipe saw, hydraulic press, and work benches. Locate a dedicated welding area adjacent to the machine shop with adequate visual screening to avoid accidental exposure to welding arc lights. In smaller facilities, the welding areas and machine shop may be conjoined in a single space.

4-3.4.1 **Figure: Example Machine Shop Floor Plan**



4-3.4.2 **Welding Area and Tank Storage**

Provide a dedicated welding area or room that may be closed off from the rest of the shop for safety. Locate the welding bay on an exterior wall. Provide a welding bench, drive-on lift, cutting torches, and arc welders. Provide electrical outlets for welders, as required, and in accordance with NEC article 630. Consider providing dedicated circuits from the main distribution panel based on welder characteristics and the potential for interfering with the operations of other equipment. Provide a separate ventilation system for the welding area. Provide vehicle access to the welding area by utilizing a dedicated stall or bay with access to the exterior. Provide fire and hazard rated storage for welding tanks within or attached to the building.

4-3.5 **General Support Areas**

General support areas include customer and staff only areas that facilitate facility operations. Staff only areas include behind the tool issue service desk and the sales inventory storage room. Customer areas include the waiting room, classroom, restrooms, and vending areas. Provide for wall mounted public telephones in or near the customer waiting area.

4-3.5.1 **Tool Issue Service Desk**

The tool issue service desk should function like the service counters at commercial auto parts stores. Customers may check out tools, arrange for FFS purchases, purchase

parts or materials, and receive assistance regarding the availability of parts or procedures. Provide computer terminals mounted on the service desk where staff members can assist customers in locating parts and information. Include stool seating behind the counter for staff members assisting customers. Provide electrical service, data connections and wiring, as needed, for customer assistance computer terminals, an electronic cash register, and inventory control devices, as required. Locate tool boxes and specialty tools for issue to customers behind or below the service desk.

Tool Issue Service Desk/Window


Tool Issue Service Desk/Window

4-3.5.2 Sales Inventory Storage

Provide a storage area for parts, supplies, materials, and tools available for purchase by customers adjacent or near the service desk. Include storage racks and wall mounted storage areas for items like mufflers, pipes, oil, filters, cleaning supplies, and similar items. Consider requirements for vendor supplied displays and inventory provided on consignment from vendors to minimize inventory holding costs. Some smaller items for sale may be displayed at the tool issue service desk area, while bigger items like mufflers and tailpipes will require a separate staff only storage room.

4-3.5.3 Customer Waiting Room

Locate a customer waiting room adjacent to the service desk to provide a comfortable place for FFS customers to relax and wait while their repairs are performed by the staff. Include lounge style furniture with comfortable chairs and couches. Provide a chilled drinking fountain, snack, and beverage machines, as required. Consider the need for a coffee station. Allow space for magazine racks, coffee tables, and other furniture, as needed. Include a large window or a glass wall for visibility into the shop areas. Provide a TV with cable or satellite service.

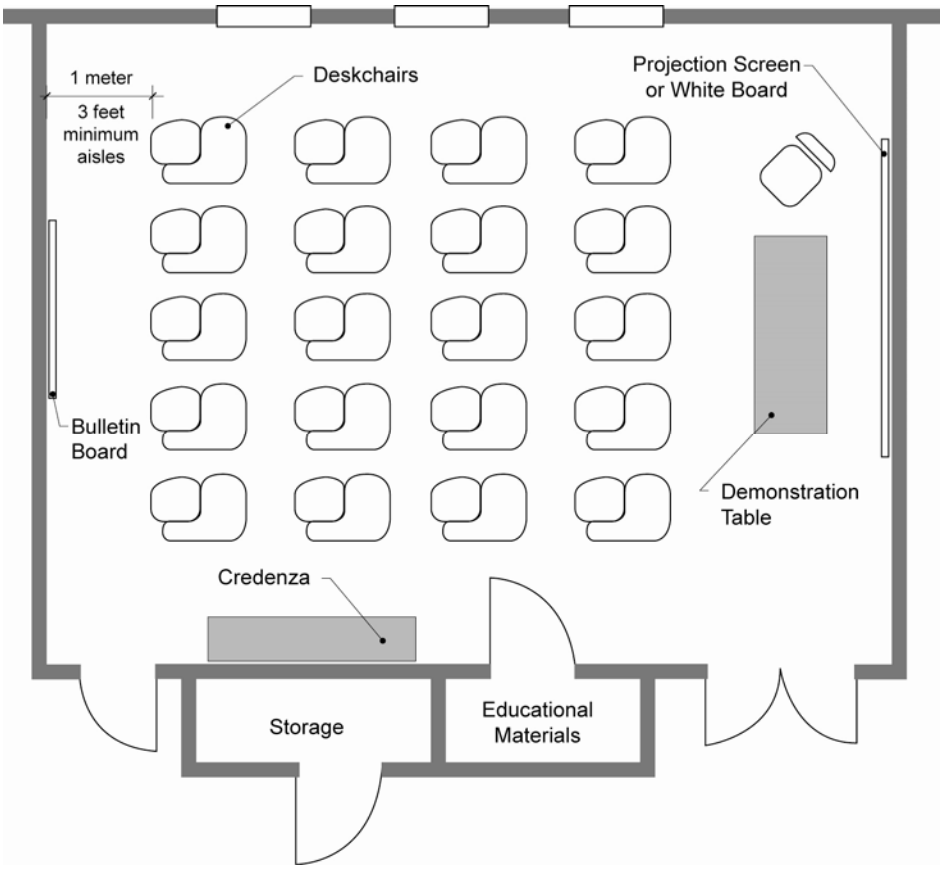
4-3.5.4 Vending Area

Address the need for snack or drink machines and other vendor-supplied equipment located inside the customer waiting room. Locate vending machines in an alcove or recessed area with electrical connections, as required. No food or beverage items shall be distributed in glass containers or bottles.

4-3.5.5 Classroom

Provide a classroom that can use used as an area for instructional use, club meetings, and similar group functions. Possible activities include movies, lectures, slide shows, and demonstrations. Classes of instruction in auto mechanics, antipollution control, upholstery, air conditioning, welding, and body work may be provided. For small facilities, this room may be combined with the staff lounge or the customer waiting area. Design the room so that it can be darkened for film presentations. Provide locally controlled dimmer switches for lights. Consider the need for telephone and video conferencing and provide the required infrastructure to provide these capabilities. Provide a lockable credenza or storage cabinets, a table, stacking chairs, and a trash can. Provide electrical and data connections with Internet access for computer presentations and printing. Consider the need for a drop down projection screen and wall mounted white boards. Provide a bulletin cork board for posting changeable information. Utilize doors with vision panels and consider the need for double doors for bringing in large demonstration items.

4-3.5.5.1 Figure: Classroom Floor Plan



4-3.5.6 Restrooms

Provide separate male and female restrooms in a centralized location to serve all occupants and staff. Restrooms shall comply with ADA and ABA requirements for accessibility to people with disabilities. For men's restrooms, include water closets, lavatories, urinals, soap dispensers, paper towel dispenser with disposal unit or hand

blowers, toilet paper holders, partitions, grab bars, mirrors, and coat hooks. For women's restrooms, provide the same amenities minus urinals, plus sanitary napkin dispenser and disposal units. Finish floors with non-skid seamless flooring, such as sealed concrete or tile. Consider the need for shower stalls.

4-3.6 Administration Areas

Administrative areas include the auto hobby shop manager's office, staff break room, and any other staff only circulation hallways adjacent to the general support areas. Locate manager's office and administrative areas adjacent to the service desk and customer waiting room. Visual monitoring of and easy access to the shop areas from these spaces is mandatory.

4-3.6.1 Manager's Office

An office with a lockable door is required for use by the facility manager to conduct day-to-day business, which includes counseling the staff. Provide a desk with compatible chair and at least two visitor chairs. Include telephone and data connections with high speed Internet access, file cabinets, shelving units, and a bulletin board. Central controls for the public address, lighting systems, and all environmental controls may be located in the manager's office. Floor shall be resilient tile or concrete, walls shall be painted CMU or gypsum board, and ceilings shall be acoustically absorbent. Under no circumstances shall an office exceed 13.38 sq. meters (144 sq. feet). General illumination shall measure 50-foot candles.

4-3.6.2 Staff Break Room

Locate a small staff break room near the service desk and the manager's office. Size requirements for the staff break room are approximately 9.29 sq. meters (100 sq. feet) for all facility sizes. Include a table with chairs, as needed, to accommodate the staff, bulletin board, staff lockers, time clock, refrigerator with an automatic ice maker, microwave, storage shelves, first aid kit, and storage cabinets.

4-3.7 Car Wash

Provide commercial quality car wash stalls outside the auto hobby shop building, but immediately adjacent. The quantity of car wash stalls and vacuum units will depend upon the installation specific requirements. Consider the space and infrastructure requirements needed for an adjacent automatic car wash that could potentially be added in the future. Consider the need for coin operated wash equipment and vending machines with typical car wash products like soap and waxes. Consider the need for an oversized stall to accommodate large vehicles.

4-3.7.1 Vacuum Stations

Provide commercial quality vacuum stations located adjacent to the car wash facilities. Most common designs feature vacuum units mounted on a concrete base for maximum durability. Dual service units may be utilized that can service vehicles on each side of the vacuum station. Provide trash containers next to each station and consider the need for covered stations for protection from the elements. Consider the need for carpet shampoo equipment and supplies.

Covered Car Wash Facilities

Exposed Car Wash Facilities

Covered Vacuum Stations

Exposed Vacuum Stations

APPENDIX A

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http://www-p.afsv.af.mil

HQ AFSVA
10100 Reunion Place
San Antonio, TX 85216-4138

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http://www.afcee.brooks.af.mil/afceehome.asp

HQ AFCEE
3300 Sidney Brooks
Brooks City-Base, TX 78235-5112

Air Force Interior Design Guidelines

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AFSVA Golden Eagle Standards

USAF Force Protection Design Guide

3. Air Force Civil Engineer Support Agency
http://www.afcesa.af.mil

HQ AFCESA/CES

139 Barnes Drive, Suite 1
Tyndall AFB, FL 32403-5319

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Hyattsville, MD 20781-1102

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1510 Gilbert Street
Norfolk, VA 23511

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N09B15
Washington Navy Yard, Bldg. 36
720 Kennon Street, SE Rm 203
Washington Navy Yard, DC 20374

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http://www.ita.doc.gov

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9. U.S. Department of Labor
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Occupational Safety & Health Administration 200 Constitution Avenue, NW Washington, DC 20210	29 CFR 1910.1048, *Formaldehyde Standard*

10. National Institute of Building Sciences
http://www.nibs.org

1090 Vermont Avenue, NW Suite 700 Washington, DC 20005-4905	*Whole Building Design Guide* http://www.wbdg.org

11. National Archives and Records Administration
http://www.access-board.gov/ufas/ufas-html/ufas.htm - ABA

700 Pennsylvania Avenue, NW Washington, DC 20408	Architectural Barriers Act (Public Law 90-480) of 1968
http://www.access-board.gov/ufas/ufas-html/ufas.htm	*Uniform Federal Accessibility Standards* (UFAS), published as Federal Standard (FED-STD)-795
http://www.access-board.gov	28 CFR Part 36, the *Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities* (ADA)

A-2 NON-GOVERNMENT REFERENCES

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http://www.awinet.org

1952 Isaac Newton Square West
Reston, VA 20190
(703) 733-0600

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2. ASTM International
http://www.astm.org

100 Barr Harbor Drive
PO Box C700
West Conshohocken,
Pennsylvania, 19428-2959
(610) 832-9585

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Headquarters
5203 Leesburg Pike
Suite 600
Falls Church, VA 22041

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http://www.nfpa.org

1 Batterymarch Park
Quincy, Massachusetts 02169-7471
(617) 770-3000

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1015 18th Street, NW, Suite 805
Washington, DC 20036

LEED™ Green Building Rating System

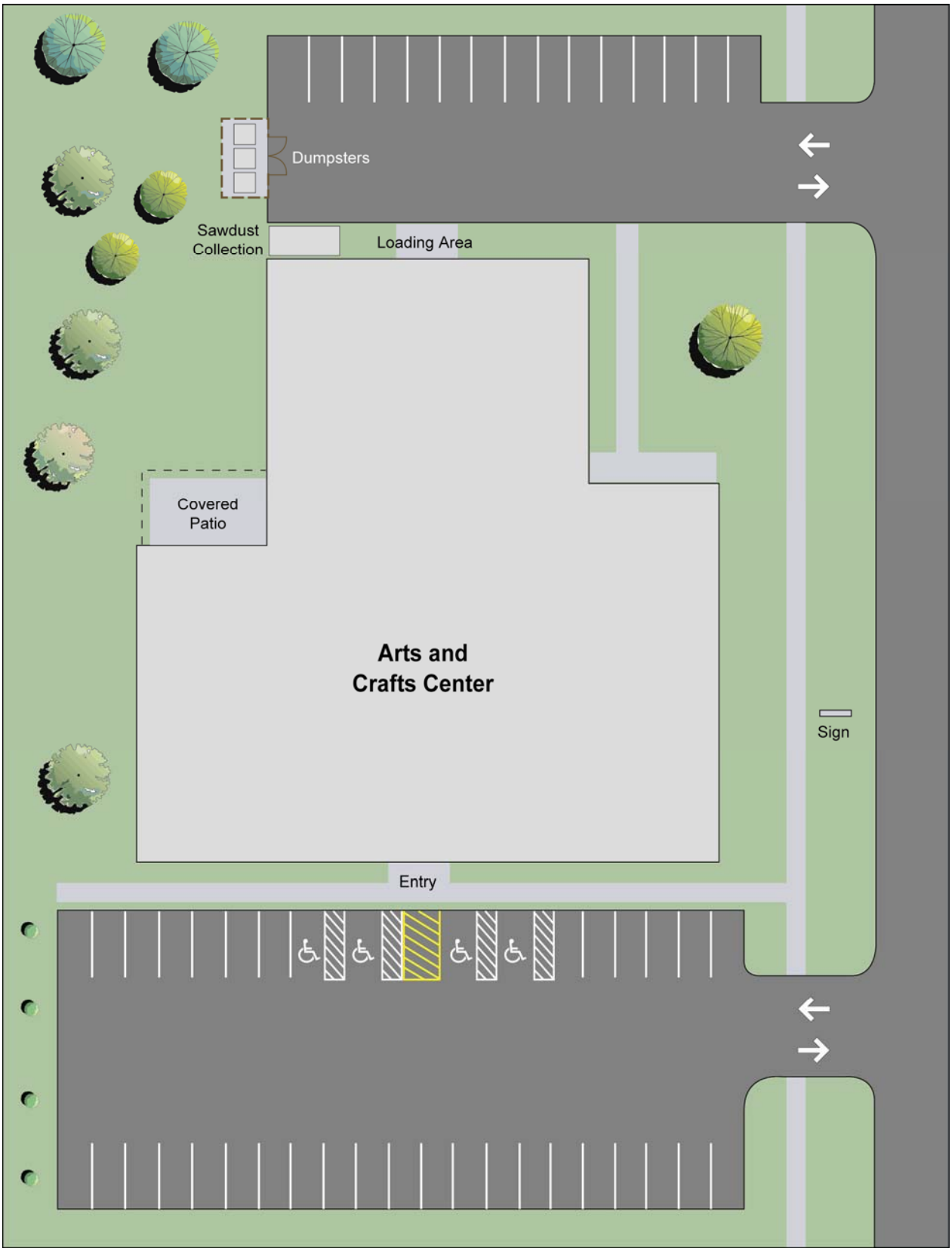
APPENDIX B

ILLUSTRATIVE DIAGRAMS

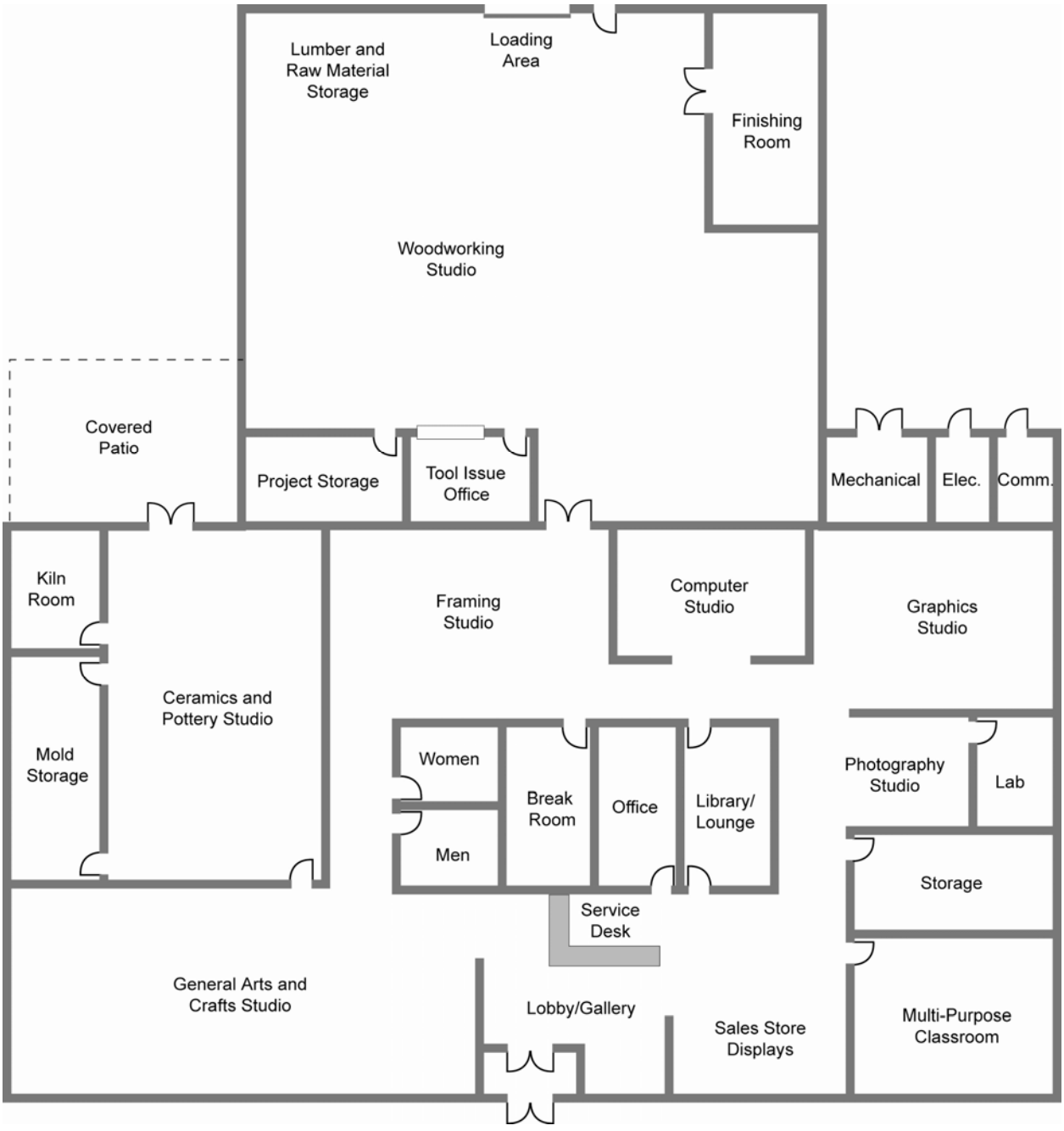
B-1 ILLUSTRATIVE DIAGRAMS

Each project requires a unique design tailored to the local character of the base, the site, and the needs of the user population. The following schemes are illustrations of design concepts based on the assumed conditions and PVA requirements of fictitious bases. They do not represent mandatory or even suggested layouts, but are provided to expand on the functional diagrams and other UFC to convey a *possible means* to accommodate the needed adjacencies. The following illustrative diagrams (Figures B-2 through B-3) are prototypical examples of collocated or separate and remote arts and crafts centers and auto hobby shop facilities. Some of the plans have been adapted from recent construction projects implemented on USAF bases. Illustrative diagrams (Figures B-4) show a potential configuration of a conjoined facility.

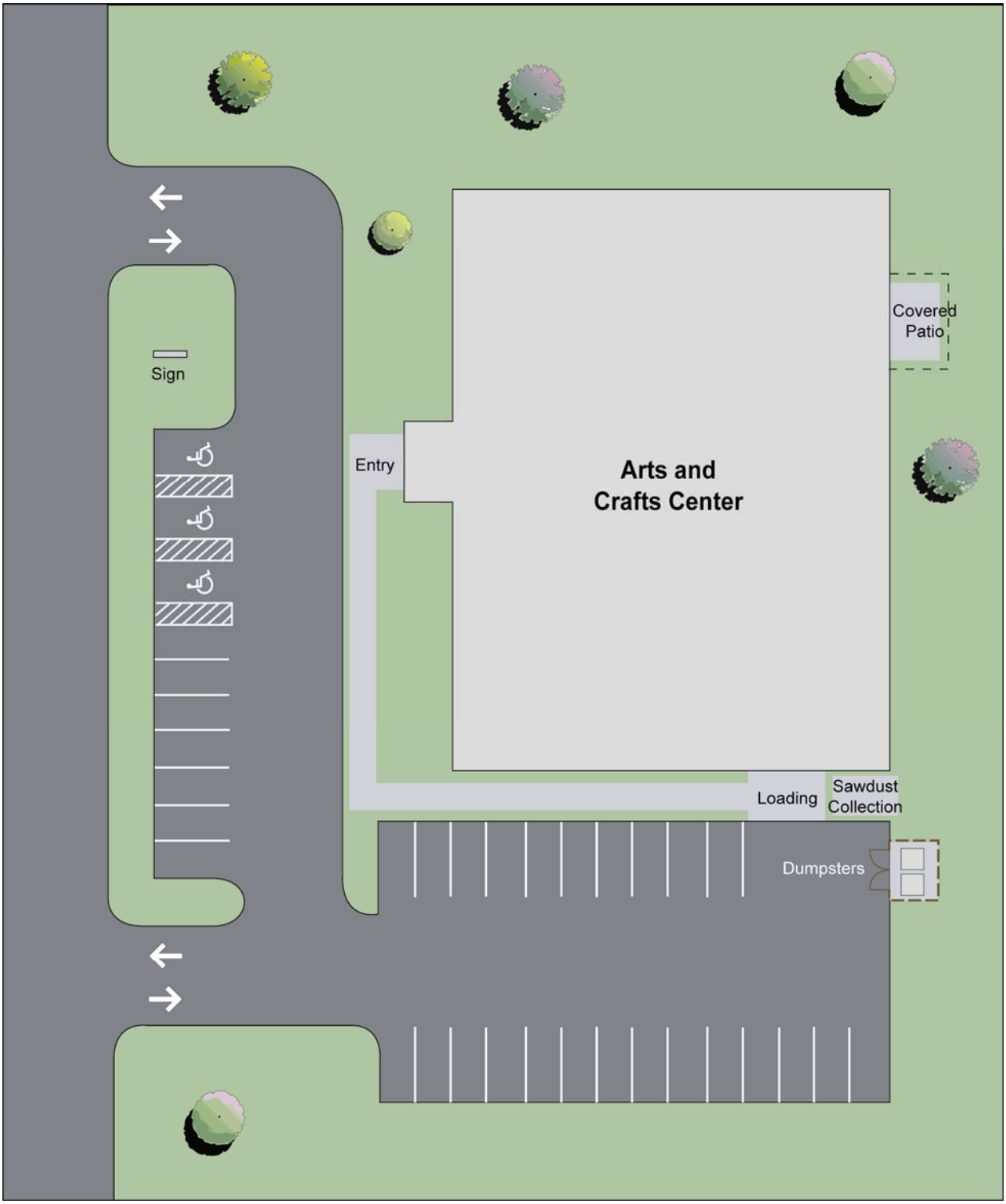
B-2.1 EXAMPLE ARTS AND CRAFTS CENTER SITE PLAN



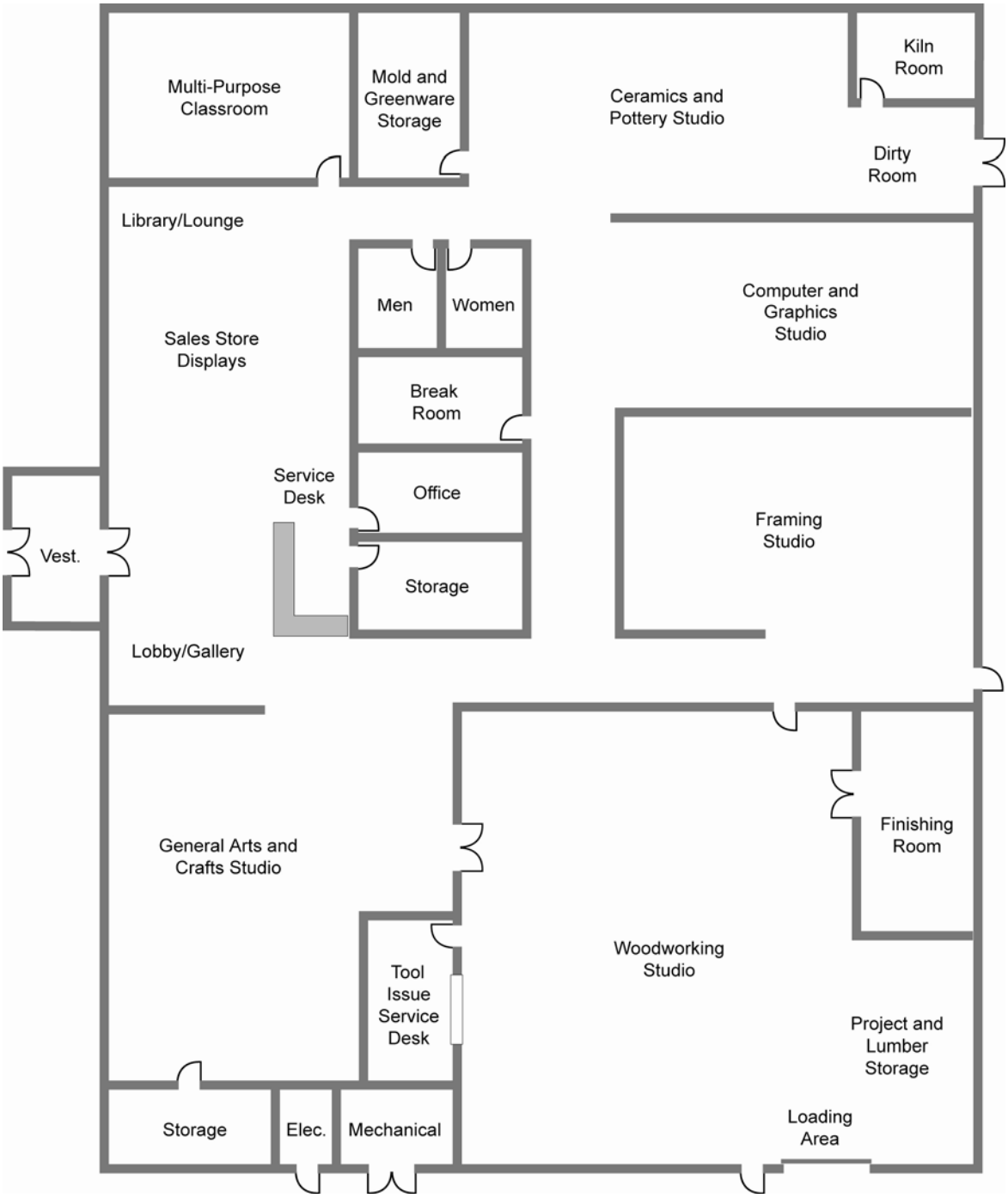
B-2.1.1 EXAMPLE ARTS AND CRAFTS CENTER FLOOR PLAN



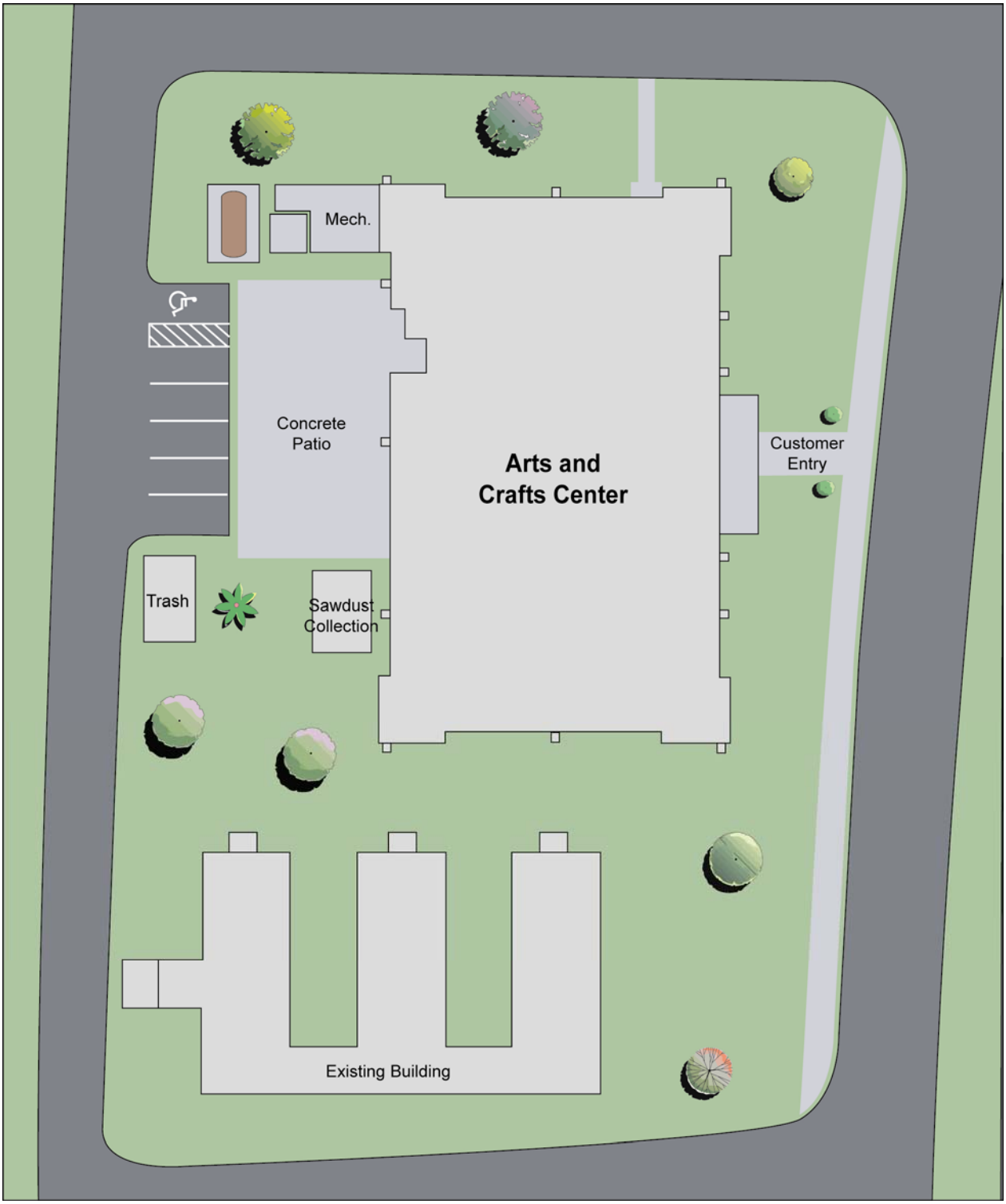
B-2.2 EXAMPLE ARTS AND CRAFTS CENTER SITE PLAN



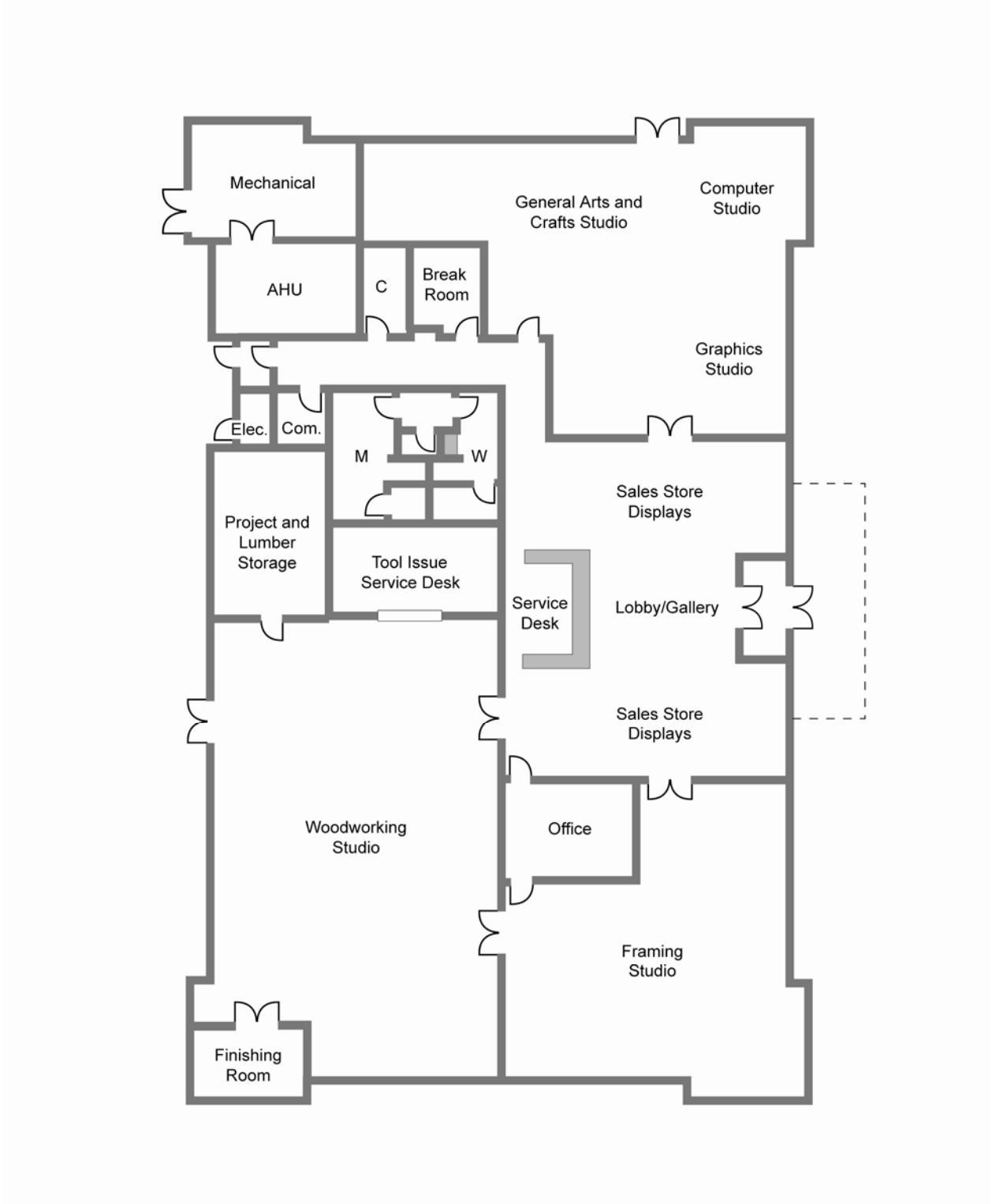
B-2.2.1 EXAMPLE ARTS AND CRAFTS CENTER FLOOR PLAN



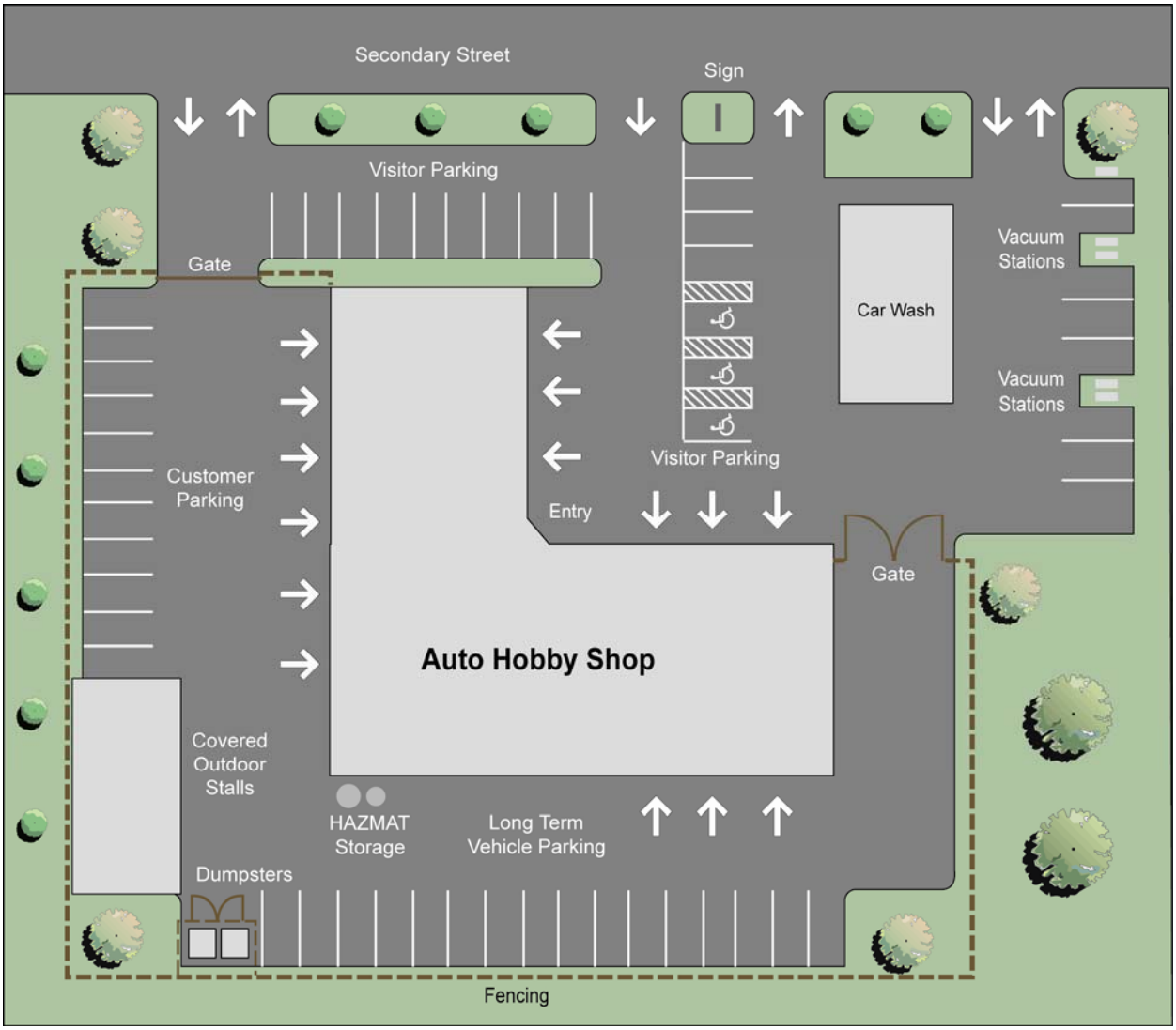
B-2.3 EXAMPLE ARTS AND CRAFTS CENTER SITE PLAN



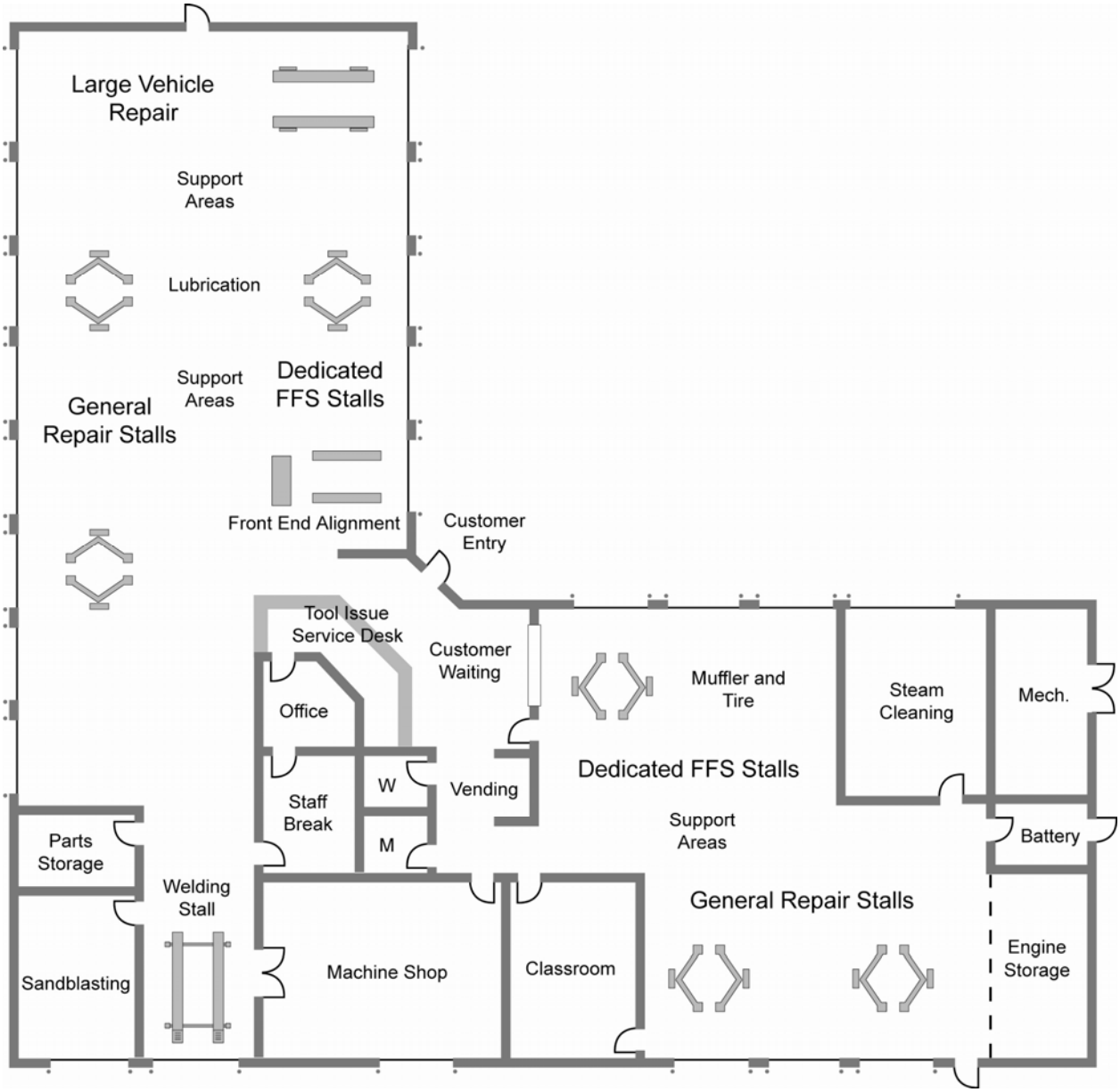
B-2.3.1 EXAMPLE ARTS AND CRAFTS CENTER FLOOR PLAN



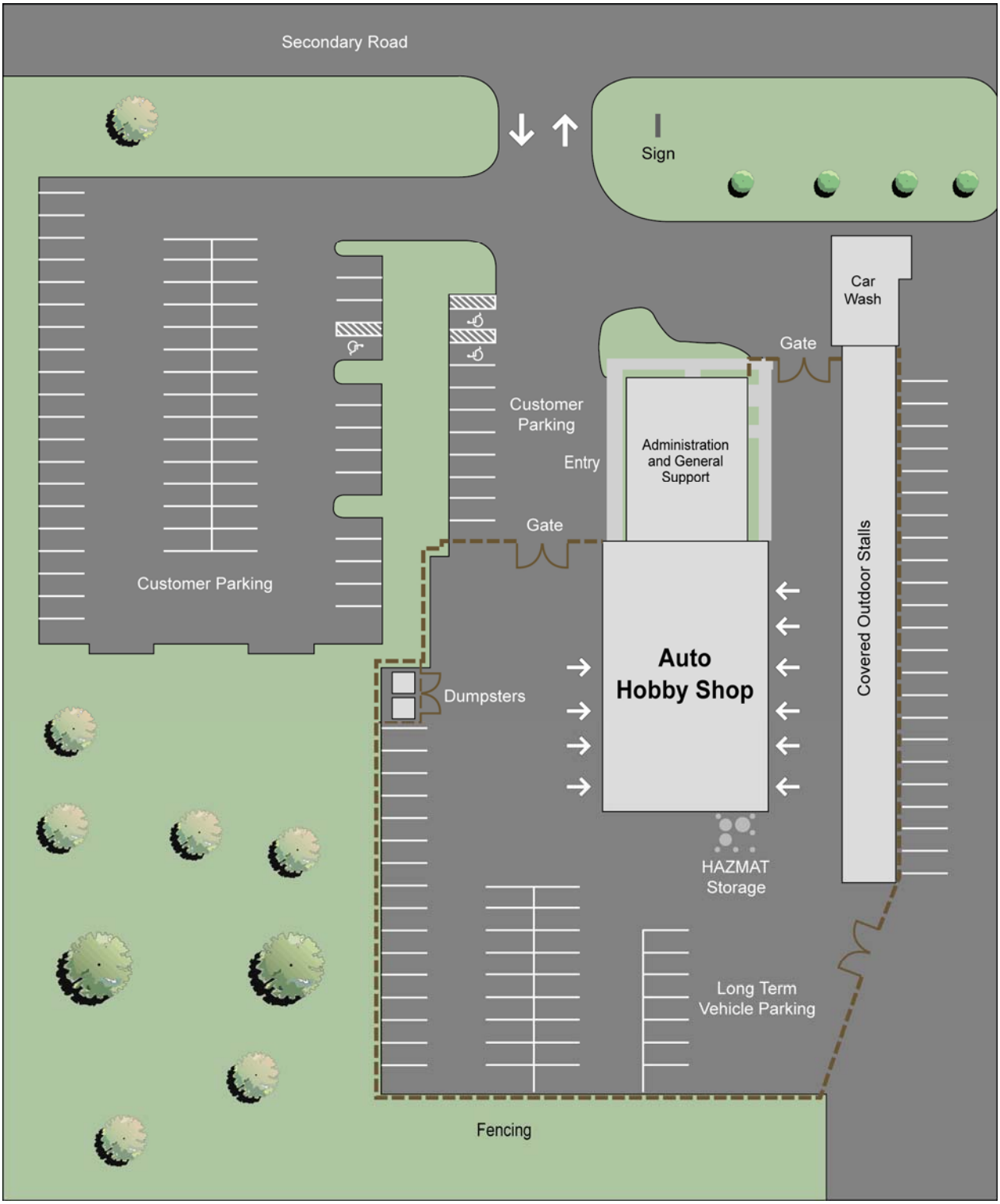
B-3.1 EXAMPLE AUTO HOBBY SHOP SITE PLAN



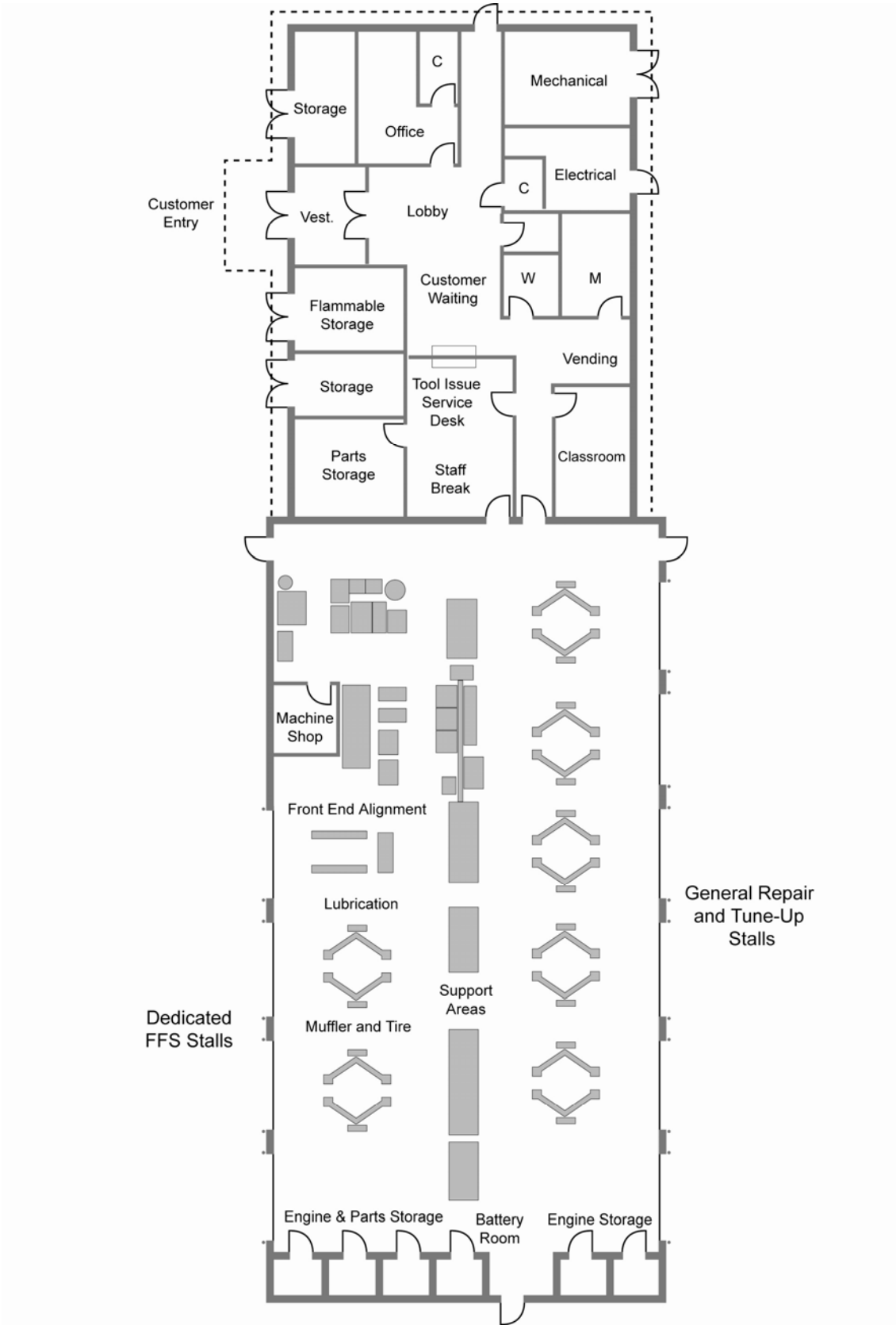
B-3.1.1 EXAMPLE AUTO HOBBY SHOP FLOOR PLAN



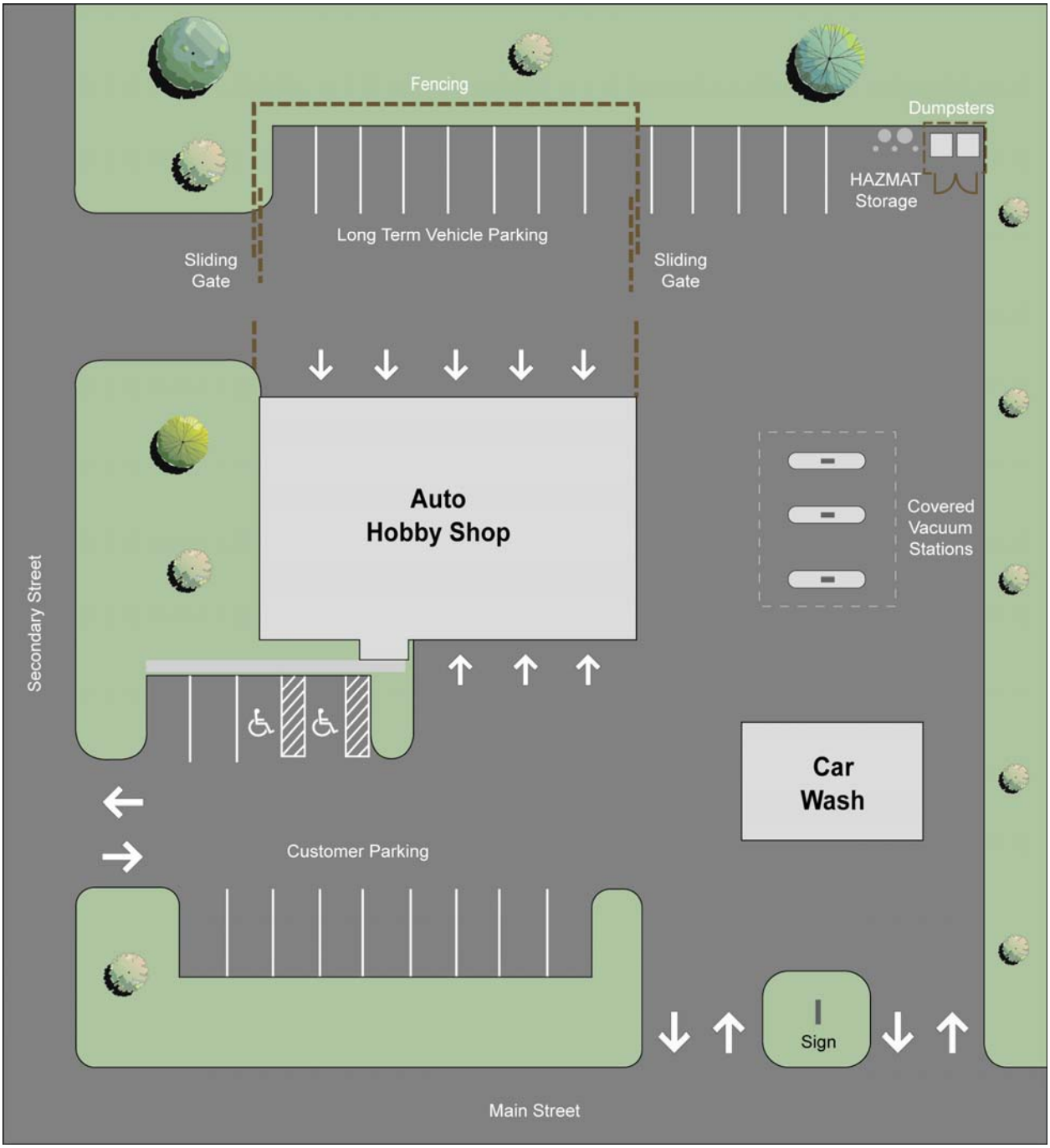
B-3.2 EXAMPLE AUTO HOBBY SHOP SITE PLAN



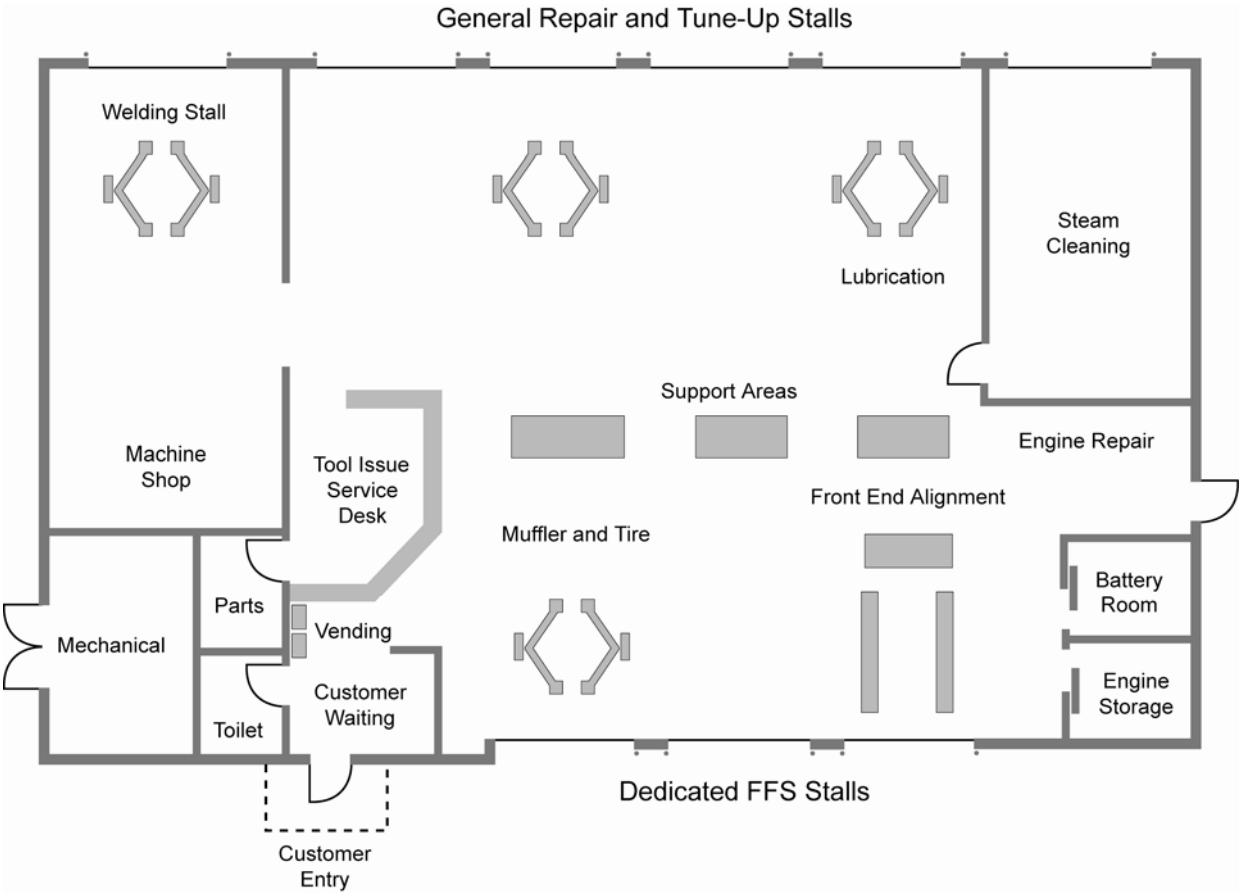
B-3.2.1 EXAMPLE AUTO HOBBY SHOP FLOOR PLAN



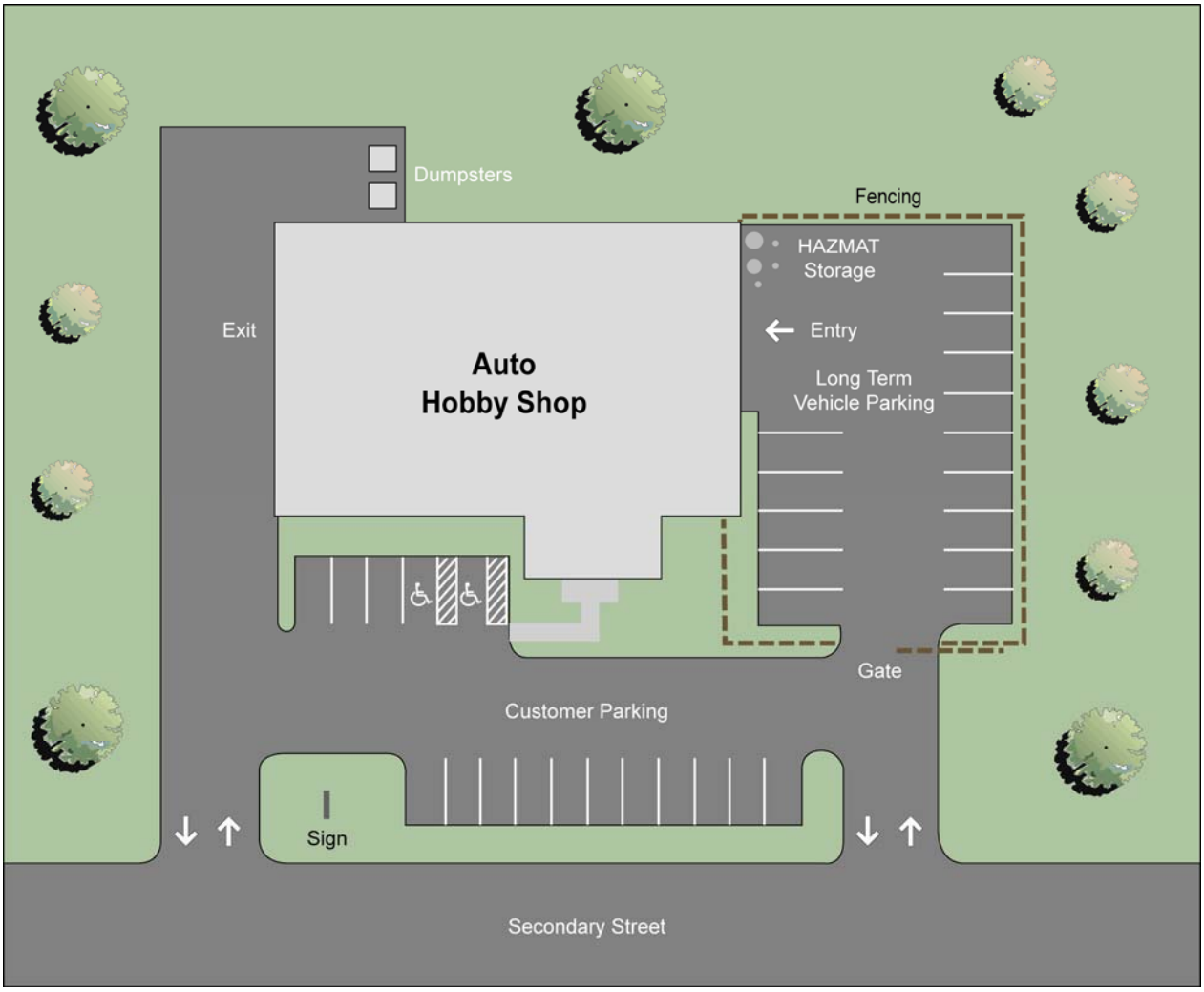
B-3.3 EXAMPLE AUTO HOBBY SHOP SITE PLAN



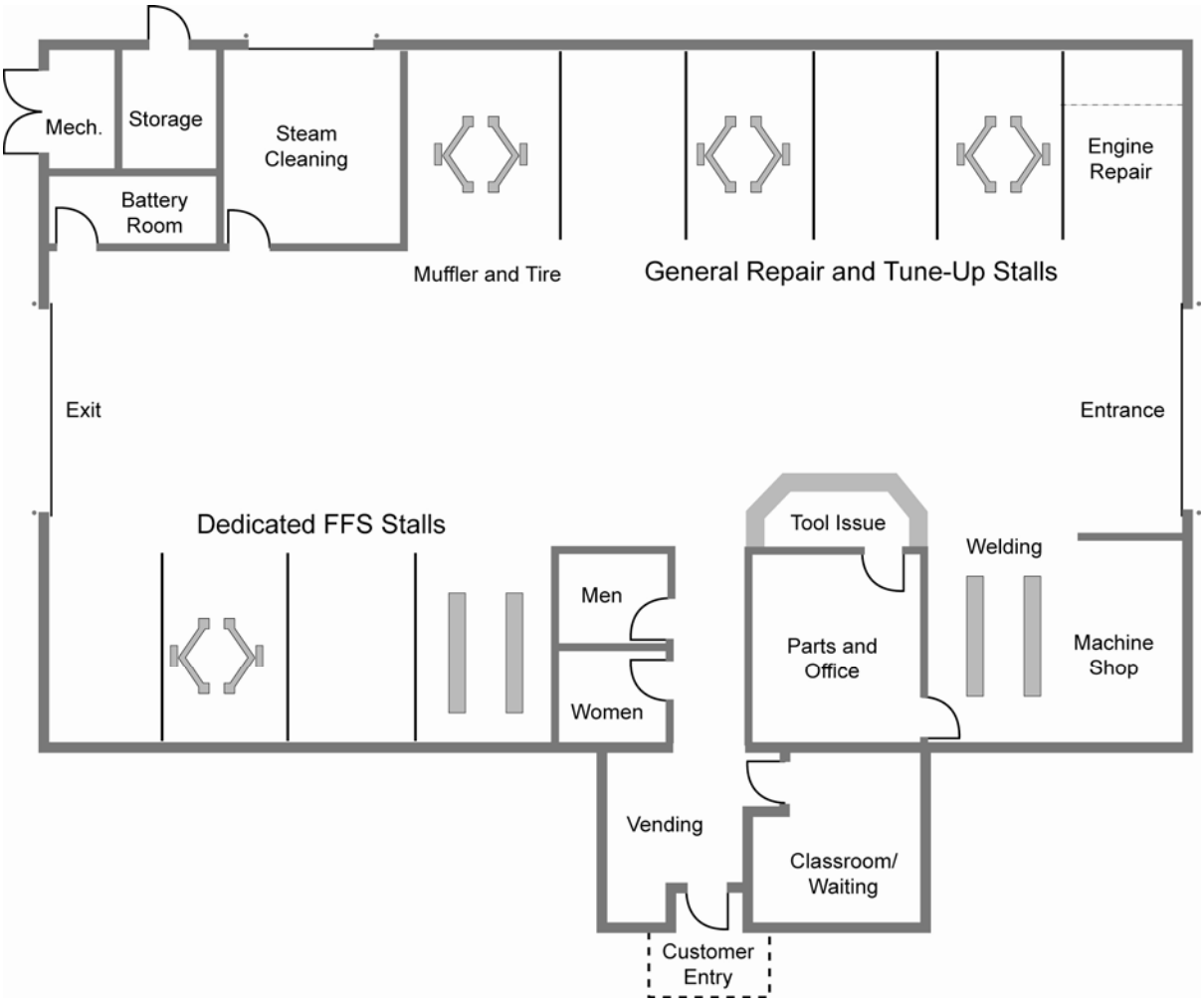
B-3.3.1 EXAMPLE AUTO HOBBY SHOP FLOOR PLAN



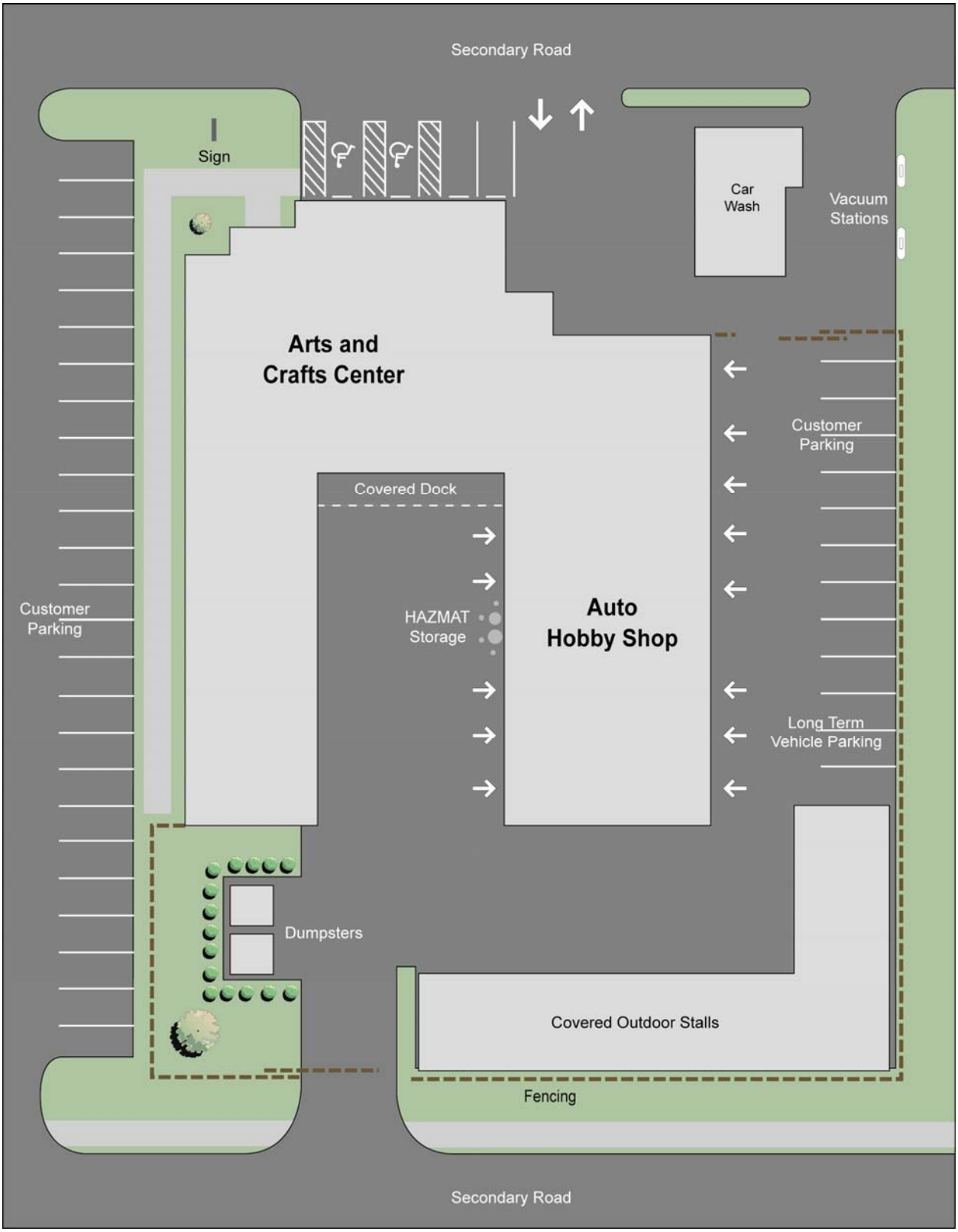
B-3.4 INTERNAL CIRCULATION AUTO HOBBY SHOP SITE PLAN



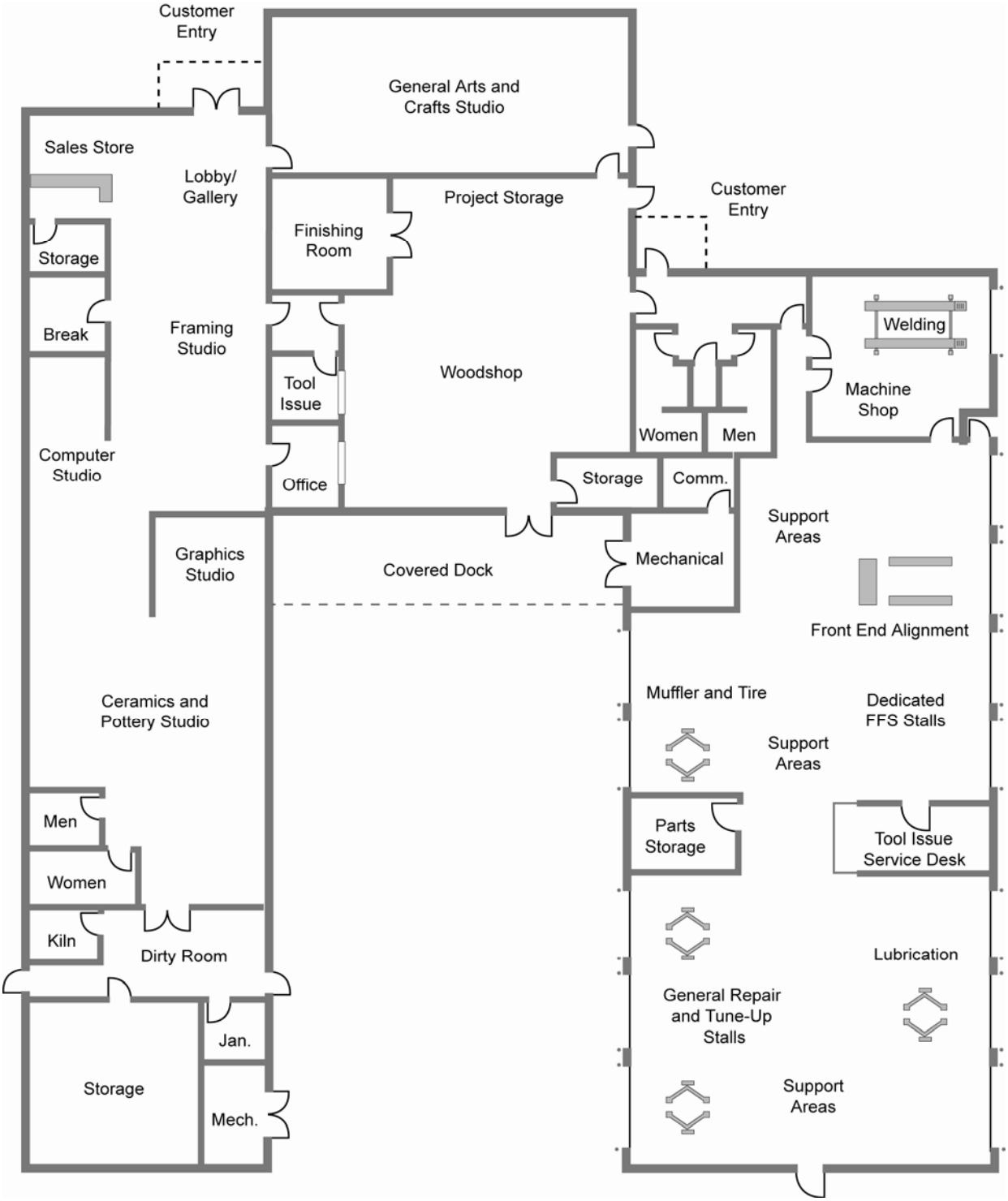
B-3.4.1 INTERNAL CIRCULATION AUTO HOBBY SHOP FLOOR PLAN



B-4.1 CONJOINED FACILITY EXAMPLE SITE PLAN



B-4.1.1 CONJOINED FACILITY EXAMPLE FLOOR PLAN



APPENDIX C

FIGURES AND TABLES

C-1 FIGURES

C-2 TABLES

APPENDIX D

GLOSSARY OF ACRONYMS

AAFES. Army and Air Force Exchange Service

ABA. Architectural Barriers Act

ABC. Association of Boards of Certification

ACC. Air Combat Command

ACO. Administrative Contracting Office

ADA. Americans with Disabilities Act

A/E. Architect/Engineer

AEI. Architectural and Engineering Instructions

AFCEE. Air Force Center for Environmental Excellence

AFCESA. Air Force Civil Engineer Support Agency

AFDIR. Air Force Directive

AFH. Air Force Handbook

AFI. Air Force Instruction

AFOSH. Air Force Occupational Safety and Health

AFMAN. Air Force Manual

AFMS. Air Force Manpower Standard

AFPD. Air Force Policy Directive

AFRES. Air Force Reserve

AFSVA. Air Force Services Agency

ANSI. American National Standards Institute

APF. Appropriated Funds

ASTM. American Society for Testing and Materials

AT/FP. Antiterrorism / Force Protection

ACRL. Association of College and Research Libraries

BCE. Base Civil Engineer

BEAP. Base Exterior Architectural Plan

BES. Bioenvironmental Engineering Service

BRAC. Base Realignment and Closure

CATV. Cable Television

CCTV. Closed Circuit Television

CE. Civil Engineer

CES. Civil Engineer Squadron

COMPUSEC. Computer Security

CONUS. Continental United States

COSATI. Committee on Scientific and Technical Information

CPSC. U.S. Consumer Product Safety Commission

dBA. Decibels

DDN. Defense Data Network

DoD. Department of Defense

DoDI. Department of Defense Instruction

DoE. Department of Energy

DSN. Defense Switched Network

DIY. Do-It-Yourself

E-Mail. Electronic Mail

EAP. Education Assessment Program

EMCS. Energy Management and Control System

EPA. Environmental Protection Agency

ESO. Education Services Officer

ETS. Electronic Transfer System

FADS. Fire Alarm and Smoke Detection System

FAR. Federal Acquisition Regulation

FED-STD. Federal Standard

FEMP. Federal Energy Management Program

FDS. Family Discovery Center

FF&E. Furniture, Fixtures, and Equipment

FOA. Field Operating Agencies

FPCON. Force Protection Condition

FY. Fiscal Year

GFCI. Ground Fault Circuit Interrupter

GES. Golden Eagle Standards

GOV. Government Owned Vehicles

GSA. General Services Administration

HAWC. Health and Wellness Center

HAZMAT. Hazardous Material

HQ USAF. Headquarters United States Air Force

HVAC. Heating, Ventilating, and Air Conditioning

IESNA. Illuminating Engineering Society of North America

IT. Information Technology

LAN. Local Area Network

LEED. Leadership in Energy and Environmental Design

MAJCOM. Air Force Major Command

MILCON. Military Construction

MIL-HDBK. Military Handbook

MWR. Morale, Welfare, and Recreation

NAF. Non-Appropriated Funds

NATO. North Atlantic Treaty Organization

NAVFAC. Naval Facilities Engineering Command

NEC. National Electric Code

NFPA. National Fire Protection Association

NISO. National Information Standards Organization

NPDES. National Pollution Discharge Elimination System

NRC. Noise Reduction Coefficient

OCONUS. Outside Continental United States

OPNAV. Chief of Naval Operations

OSHA. Occupational Safety and Health Administration

PA. Public Address

PACAF. Pacific Air Force

PDWS. Public Drinking Water System

PFD. Personal Floatation Device

PM. Project Manager

POV. Privately Owned Vehicles

PVA. Project Validation Assessment

PWS. Performance Work Statement

SOW. Statement of Work

SRAN. Supply Record Account Number

UIC. Underground Injection Control

UFAS. Uniform Federal Accessibility Standards

UFC. Unified Facilities Criteria

US. United States

USACE. United States Army Corps of Engineeers

USAF. United States Air Force

USAFE. United States Air Forces Europe

USAFSE. United States Air Force Supervisory Examination

USGBC. United States Green Building Council

USCG. United States Coast Guard

UV. Ultra-violet (sunlight)

WIMS. Work Information Management System